The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Future of Chemical Engineering

A PROMINENT authority on the construction of chemical plant once remarked that the cost of a number of chemical substances in this country was very much higher than in several other countries merely because of our neglect of chemical engineering. This reflection —which was much nearer the truth than many then liked to believe—was levelled at us at a time when we were barely conscious of the fact that any such special science as chemical plant construction really existed, when our designs were something in the nature of heirlooms, and when chemical works managers had neither the inclination nor the opportunity to exchange ideas with those of their colleagues who had begun to appreciate that efficiency of production meant all the difference between getting and losing business.

There can be no doubt that in the latter part of the last century and in the early part of this the comparative ease with which prosperity was attained had driven us into a more or less listless frame of mind from which we were only aroused by the increasing thoroughness with which problems were being tackled in other countries, and finally by the great experience of the war. The majority of us will readily recall the days when the professional engineer tolerated the works chemist as something in the nature of an excrescence without definite position or authority; his ambition was crushed by continual routine work, and his suggestions were frequently regarded as something approaching insolence. The chemical engineer, like the technical chemist, is the product of recent years, and both, fortunately, are now looked upon by those who have any thought for the future prosperity of the country as indispensable assets to be encouraged and developed.

To-day there are two well-established, hard-working bodies—the Chemical Engineering Group and the Institution of Chemical Engineers—to cater for the requirements of those who are already engaged in or who intend to adopt this new profession, and with the exchange of ideas which is now made possible the technique of the subject must necessarily proceed on quick and definite lines. Specialisation in this new direction should, moreover, prove attractive from the material point of view, for, as the profession is a new and by no means an overburdened one, opportunities should present themselves for interesting and lucrative employment. We have often pointed out that some of our older chemical works are conspicuous for the fantastic examples of engineering which they exhibit, but nowadays we at least have the satisfaction of knowing that the time for monstrosities has gone.

Perhaps no better illustration of the orderly lay-out which is possible when engineering skill has been employed in the design of works can be given than the works of the United Alkali Company, which Mr. Herbert Blyth describes in this issue. The reader will have no difficulty in forming the opinion that in this instance, at least, means have been found which ensure that the handling of an immense quantity of material is expeditiously and economically effected and that there has been no hesitation in drawing upon the resources of modern mechanical engineering. This contribution does not stand alone. The "impressions" of American conditions, which Mr. J. A. Reavell, the chairman of the Chemical Engineering Group, has brought back with him are well worth noting. It is interesting to have the opinion of so good a judge that in this field we have nothing to fear from foreign rivals either in design or in construction of plant. The article by Mr. W. H. Coleman states as simply and as clearly as we have ever seen it stated the essential function of the chemical engineer, and attention to what he says, at this constructive stage of the new science, may avert both confusion and disappointment. Mr. Rex Furness (whose blindness, fortunately, has not cut him off from his scientific

work or prevented him from writing informingly about it) deals with the vital question of acid and rust-resisting materials for chemical works, describing several metals and alloys and discussing their chemical fitness for use. Finally, it is satisfactory to find, from an account of the recently established Institution of Chemical Engineers, that the membership is steadily growing and that a sound policy is quietly taking practical shape.

Chemistry at the B.A. Meetings

THE annual meeting of the British Association, which will be held in Liverpool from September 12 to 19, is expected to attract an attendance of over 3,000. The Association last met in Liverpool in 1896, when Sir Joseph Lister was the president. This year Sir E. Rutherford occupies the chair, and the subject of his presidential address will be "The Electrical Structure of Matter." Though Germany will still be unrepresented, the attendance of foreign delegates promises to be large, and in view of the fact that the Association meets next year in Toronto several of Canada's best-known scientists will be present. The programme, as usual, covers a very wide field, and one item of special interest will be an address by Dr. F. W. Aston of Cambridge, in which, following up his lecture on "The Atomic Theory" last year at Hull, he will give the results of his past year's work on the same subject.

The programme of the Chemistry Section preserves a reasonable balance between pure and applied science. The president of the Section this year is Professor F. G. Donnan, whose address will be on "The physical chemistry of interfaces." Other lecturers will be Professor Sven Oden on "The formation of precipitates"; Professor G. S. Whitby on "The nature and significance of the resin of Hevea rubber"; Professor G. N. Lewis on "The quantum theory in chemistry"; Dr. N. V. Sidgwick on "The Bohr atom and the Periodic Law"; Dr. D. Coster on "High frequency spectra and the Theory of Atomic Structure"; Miss Usherwood on "The activation of hydrogen in organic compounds"; Dr. E. F. Armstrong on "Enzymes"; Dr. K. G. Falk on "The relation of certain Enzymes to tissue differentiation and tumour growth"; Mr. W. G. Palmer on "Catalytic actions in presence of copper"; Professor W. Vernadsky on "Aluminosilicates"; Dr. G. Hevesy on "The chemistry of Hafnium"; Senatore G. Conti on "The utilisation of volcanic steam"; Miss E. S. Semmens on "The biochemical effect of polarised light"; Dr. R. G. Fargher on "Cotton wax"; Dr. D. A. Clibbens on "The absorption of methylene blue by cotton"; and Professor H. E. Fierz on "The sulphonation and nitration of naphthalenes." Those who regard this programme as too abstract in character may find compensation in visits to industrial works in the neighbourhood, including the United Alkali works at Widnes, the Highfield Tannery at Runcorn, Bryant and May's match works, Price's Patent Candle works, Johnson Brothers' dyeworks, the British Oxygen Co.'s works at Bootle, the Union Cold Storage Co.'s works in Liverpool, Port Sunlight (Lever Brothers), and the works of Joseph Crosfield and Sons.

Does Commercial Secrecy Pay?

THE contrast is so often made, and almost invariably to our disparagement, between the policy of secrecy generally pursued by British firms and the policy of openness said to be followed by firms of other nations, notably American and German, that it is difficult to dismiss it as merely imaginary. The latest reminder on the subject comes from Mr. J. A. Reavell, an engineer familiar not only with British but with French and American practice, who returns from the United States impressed with the frankness with which people over there discuss their business. Not only is their plant freely open to inspection, but the visitor is shown their costing sheets, the details of their organisation, their methods of soliciting business, their advertising schemes, and all the rest.

Rarely does a British visitor undergo such an experience without surprise. Why, he naturally asks, should the American business man be so open about his business while rivals at home are so close? How can he afford to give away so freely secrets so jealously guarded at home? The explanation is to be found in a totally different attitude of mind. What we insist on regarding as vital secrets of trade are no secrets at all in the States—it is doubtful, indeed, whether even here they are secrets except in name. For, whether one takes the manufacturer or the merchant, there is very little in either case with which competitors are not already familar. But we keep up the pretence of knowing things that nobody else knows, while the American business man has frankly given it up.

The gain, we think, is on his side. When a dozen engineering or chemical firms decide to exchange plans, each member who gives something to the remaining eleven gets in return much more. Relatively to one another they remain on the same level; the only difference is that all are better informed, and the more capable, therefore, between them of upholding the industry in which all are engaged as against outside competitors. Here, the opposite policy is pursued. Between manufacturers, between merchants, between consultants, even between societies, there remains an astonishing spirit of suspicion. Each prefers to act in isolation, believing that by so doing he can best keep ahead of his neighbours. Which is really the better way? We are strongly inclined to think that the collective attitude in the end pays better than that of isolation. The doctrine of living too much to oneself often proves bad business as well as bad ethics.

Standards for Chemicals and Alloys

THE plea which Mr. Reginald G. Johnston, of the Midland Laboratory Guild, Ltd., makes on another page for the preparation of standard samples and standard chemicals for use in analytical laboratories is one that touches all engaged in analytical work and might well form the subject of discussion by our chemical organisations. A considerable advance has been made in the last few years in the field of standardisation, and here is a suggested important extension which might well be taken up. So far most of the published standards relate to steel and iron analysis, while, as our correspondent points out, little or no attempt seems to have been made to co-ordinate the

far more complex analyses involved in non-ferrous and other analysis. As regards analytical chemicals, Mr. Johnston suggests that what is needed is "a series of standard samples of pure chemicals of known and authentic purity, and a series of standard alloys also duly authenticated, obtainable by all laboratories." The method proposed is that each of a large number of laboratories should undertake the preparation of one alloy or chemical and its sampling and distribution to a number of other laboratories for analysis. If the reports were collated and a definite composition determined on, a whole range of very useful samples might become available. Here, as in so many other chemical matters, all that seems to be required is co-operation and leadership, and we fear our correspondent is only too near the truth in his view that the weakness of the profession lies in the disunion of its members. There must be a large body of chemists directly interested in this matter, and we should be glad to publish their views and any suggestions for taking definite action, either through the existing societies or independently.

Works Managers and the Smoke Bill

THOSE who have had a sight of the recently issued text of the Smoke Abatement Bill which was introduced in the House of Lords by Lord Onslow will probably have formed the opinion that if the position is to be so tightened up and the new proposals rigidly enforced the lot of the works manager will not be altogether a happy one. There is little likelihood of the Bill becoming operative this year, so there will be ample time for becoming acquainted with its penalties and the best means of avoiding them. From our own experience we have found that the ordinary chimney attached to steam-raising plant is by far the most common offender in the way of smoke emission, although a very considerable improvement has been registered since the use of coke and coke-breeze in lieu of coal has become more general. The new Bill, however, would seem to be designed to make matters none too easy for consumers of low-volatile fuel, for it is now proposed to penalise smoke irrespective of its colour, while the expression "smoke" is to include "soot, ash, grit and gritty particles."

Those who have had experience with the modern forced-draught boiler furnaces will appreciate that with certain powdery and friable fuels it is extremely difficult to preclude the emission of a small quantity of solid particles from the chimney, and though many devices for arresting these dust particles have from time to time been introduced they have usually failed to prove wholly effective, or their use has been followed by an untoward influence on chimney draught. Necessity, however, is the mother of invention, and it may well be that now the necessity is likely to arise we shall find the inventor equal to the occasion. Those associated with industrial chemical works will, at least, be gratified to know that of the Committee appointed to consider the Bill there are two members—Mr. W. S. Curphey and Professor J. B. Cohen—who have full acquaintance with the practical difficulties which beset the transgressor.

The Increasing Study of Text Books

IT is satisfactory to hear, from the annual address of the chairman of Benn Brothers, Ltd., of the ever-increasing demand for text-books of the first class dealing with the science and technology of industry. The proprietors of THE CHEMICAL AGE have already added something of permanent value to chemical literature, both periodical and permanent, and the ready response these efforts have met with is an encouragement to further enterprise on the same lines. This is extremely satisfactory as showing how keen the younger generation of chemists are on knowing all that is to be known of their science and technology. There are here and there, it is true, chemical antiquities who proclaim that they never read a trade or technical newspaper or that they never read more than the one they began to peruse about half a century ago. Such types may have a past, but they cannot have much of a future. The really progressive student in pure or applied chemistry knows that he cannot afford to miss any source of new light, and considering the cheapness of technical journals to-day, there is little excuse for missing any new developments. In any case no scientist or technologist who pays heed to his own reputation can afford to miss anything, and the wise policy is to watch, if not actually to read, all that is published.

Points from Our News Pages

The Calendar

Aug. 31 to Sept. 22	Shipping, Engineering and Machinery Exhibition.	Olympia, London.
Sept. 10-13	Institute of Metals: Annual Meeting.	Manchester.
12-19	British Association for the Advancement of Science: Ninety-first Annual Meeting.	Liverpool.
17	Institution of Rubber Industry. 8 p.m.	Engineers' Club, London.
17-18	Iron and Steel Institute	Milan
Oct. 6	West Yorkshire Metallurgical Society: Annual Meeting	Huddersfield

Transport Facilities in Chemical Works

By Herbert Blyth, M.Inst.C.E.

The writer has lately been engaged in studying the facilities which exist in chemical works for the transport and handling of materials in bulk. Below he draws attention to the exceptional facilities which are to be found at the works of the United Alkali Company at Widnes.

REFERENCE has previously been made in THE CHEMICAL AGE to the importance attaching to the subject of economical handling of materials in chemical works. This article deals with the equally significant questions of :—

(1) The transport facilities upon which the works depend for the supply and export of materials ; and

(2) The terminal arrangements for loading and unloading.

With a view to making an investigation of this subject, the writer has paid several visits to chemical works and many other works of a similar character, and in practically every case the internal handling problem has its origin in the terminal arrangements, which are to a great extent dependent upon the external transport facilities. Where the access to the works is difficult or divided—as it often is —the internal handling problem presents much greater difficulties to the engineer than another case in which the external transport arrangements are good and the access into the works suitably constructed. The reason for this relation of circumstances is not difficult to find, for the development of mechanical handling has been often brought about by absolute necessity. Where the access to the works is unrestricted, the materials generally arrive in larger consignments—whether rail or water-borne—and, consequently, in order to avoid congestion and, possibly, demurrage charges, mechanical methods have to be found for unloading and clearing the material at the arrival station more rapidly than hand labour can deal with it. In such a case, where the proper means have been chosen for the unloading station, and where beneficial results have been obtained to justify the installation, it is often found that further progress in the solution of the general handling problem is stimulated by the initial success.

Hence, the importance of making a correct start with a broad outlook towards future developments should be fully realised, for it is in this way that most of the handling problems in the chemical industry will eventually be solved.

United Alkali Co.'s Works

To take a specific case, the United Alkali Company's works at Widnes and Runcorn will best serve to illustrate the co-relation existing between transport, handling, and development. The situation at Widnes is unique as regards transport facilities, and the great success and expansion

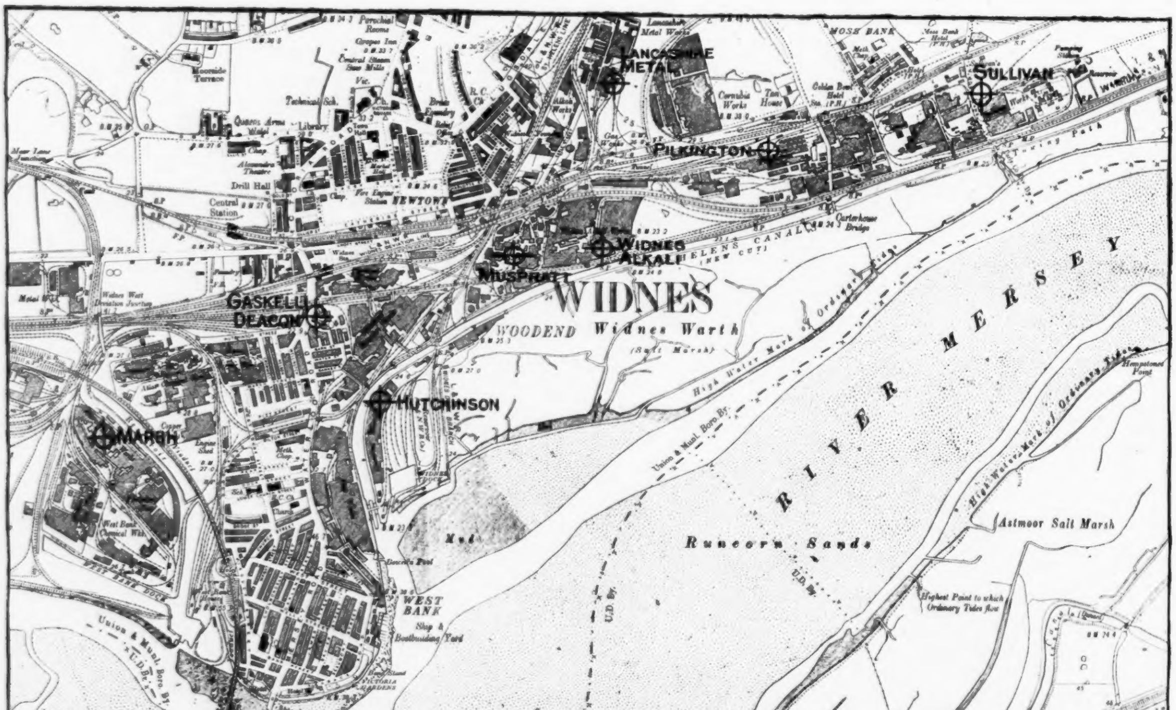


FIG. 1.— GENERAL MAP OF WIDNES, WHERE THE UNITED ALKALI CO'S WORKS ARE SITUATED.

of these works is very largely due to the fact that the natural resources of the site have been turned to good account.

A glance at the map, Fig. 1, will give an idea of the wonderful potentialities which the United Alkali Company possess for the development of their business. It only requires a reasonable revival of trade to set up sufficient demand for the output to enable this great concern to turn out their products at such prices as could compete favourably with the production from any other chemical factory in the world.

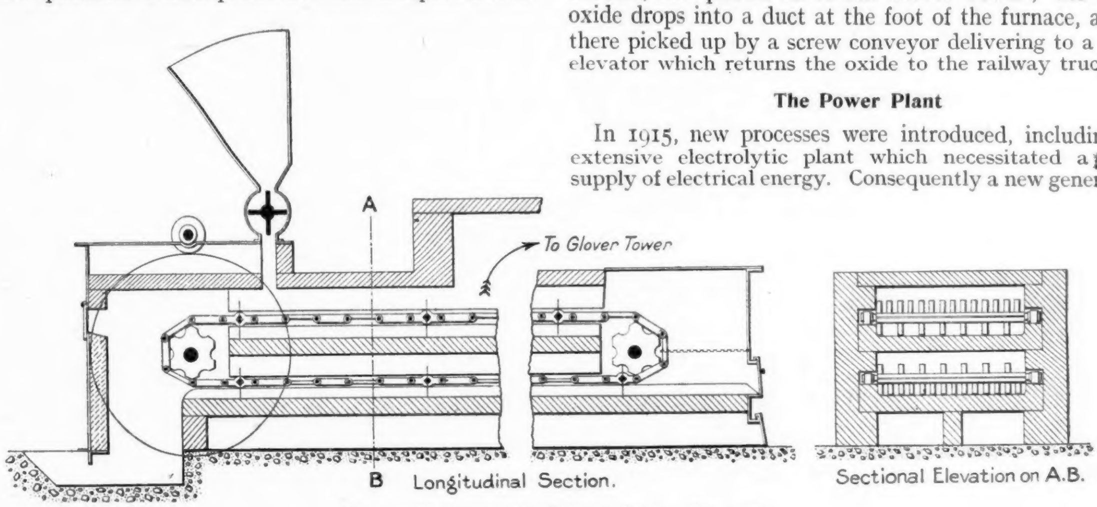


FIG. 2—MECHANICAL SPENT OXIDE BURNER.

It will be seen that the geographical position of the works is exceedingly favourable. On the north side, the works are served by the Great Central and Midland Joint Railway, and on the south by the L. & N.W. line connecting Warrington and Garston Docks. There are also L. & N.W. branch lines crossing the works, and, in addition, the St. Helens Canal provides a further means of communication on the south side with outlets to the Mersey, while the Manchester Ship Canal gives access to Runcorn works.

The traffic to and from these works consists *inter alia* of: (1) Fuel. (2) Pyrites, which is brought from Garston Docks per L. & N.W. Railway in 10-ton low-sided wagons. This is unloaded by hand. (3) Rock salt arrives at the L. & N.W. West Bank Dock in coastal vessels, and is unloaded into trucks. (4) Spent oxide arrives by rail from all parts of the country in very large quantities, and then, after utilisation of the "sulphur content," is returned by rail to the various gas works. (5) Bleaching powder, caustic soda, soda sulphide, and soda crystals are all exported *via* the St. Helens Canal for transhipment at Liverpool. (6) Hydrochloric and sulphuric acids are loaded into tank barges on the Weaver Canal at Runcorn, and travel *via* the Manchester Ship Canal and the River Mersey to various destinations. Rail tanks are also extensively used for this traffic.

The Oxide Plant

Referring to the arrangements for handling the materials inside the works, the oxide plant and the coal handling installations at the new power house are the most important, and they possess some interesting features.

The oxide, after delivery from rail, is handled entirely by automatic mechanical means right through the sulphur recovery furnace, and delivered again to railway trucks. The only hand labour employed is in connection with the discharge of the spent oxide from the trucks into a ground receiving hopper. From this hopper the oxide is lifted by a bucket elevator, and delivered direct to spiral conveyors, which in turn distribute the material to a series of hoppers placed above a battery of Wyld furnaces.

Longitudinal and cross sections of the furnace are given in Fig. 2, and show the method of feeding in the oxide and the conveyor for passing it slowly through the furnace. The sulphur gases are taken off about the middle of the furnace, and passed on to the Glover Tower; the burnt oxide drops into a duct at the foot of the furnace, and is there picked up by a screw conveyor delivering to a short elevator which returns the oxide to the railway trucks.

The Power Plant

In 1915, new processes were introduced, including an extensive electrolytic plant which necessitated a large supply of electrical energy. Consequently a new generating

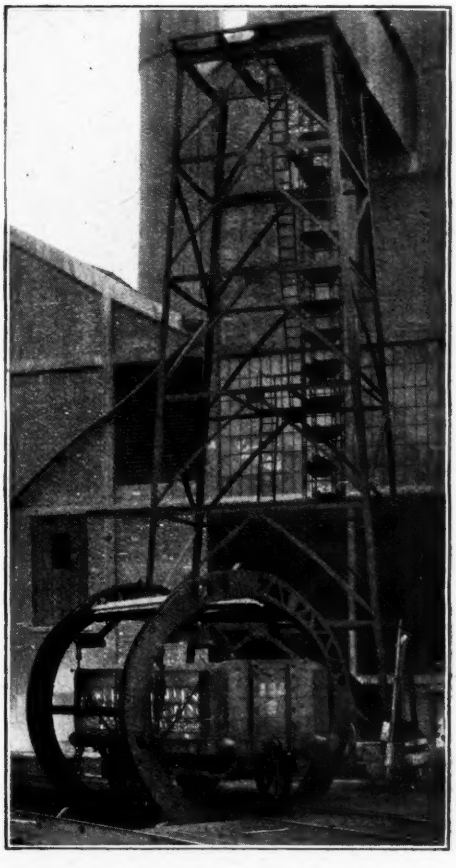


FIG. 3—TRUCK TIPPER AND G.B. ELEVATOR

station of considerable dimensions has been laid down, preparation having been made for four British Thomson-Houston turbo-alternators, to give a total installed capacity of 26,000 kw. To supply the necessary steam

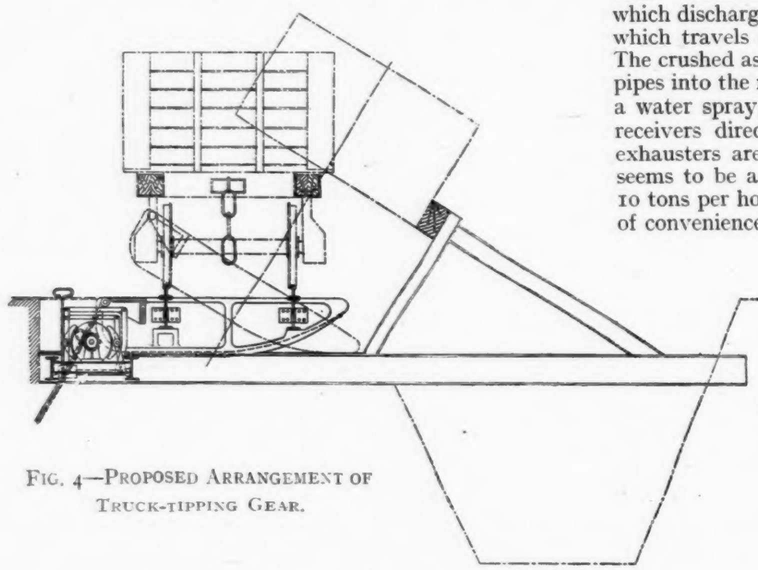


Fig. 4—Proposed Arrangement of Truck-tipping Gear.

for this plant, twelve Babcock and Wilcox boilers have been provided for, together with an 1,800-ton coal bunker and coal handling plant.

The coal sidings run along close to the side of the station and across the end where a rotary truck tipper is provided. Each truck is turned completely over by this automatic tipper—the coal being delivered into a hopper below the rails and automatically fed to a gravity bucket elevator and conveyor which distributes the coal into the overhead bunkers. At present there is only one line of conveyor, but a second line is provided for.

Fig. 3 shows the truck tipper and G.B. elevator. A tipper of this type should be very serviceable in chemical works generally for unloading any kind of dry material

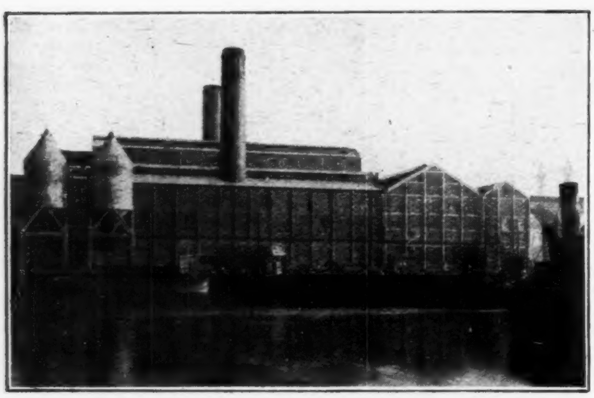


Fig. 5—General View of Generating Station showing the two concrete receivers to which the ashes are delivered by the pneumatic plant.

from railway trucks provided the quantities to be handled warrant the expenditure. Another form of tipper, shown in Fig. 4, has been found very useful where the quantity to be handled is relatively small, and particularly in cases where it is desirable to avoid a pit or to restrict the excavation to a shallow depth.

The furnace ash is handled by a suction equipment in duplicate, each being capable of dealing with 10 tons per hour. Each furnace is fitted with two concrete ash hoppers which discharge their contents into a motor-driven crusher, which travels on rails from end to end of the basement. The crushed ash and clinkers are drawn through eight-inch pipes into the receivers (shown in Fig. 5), and subjected to a water spray, the cold ashes being discharged from the receivers direct into railway trucks. The duplicate air exhausters are each driven by a 70 b.h.p. motor, which seems to be a considerable power for a handling duty of 10 tons per hour, but the need in this case was a question of convenience rather than economy in power.

The question of overall economy of handling throughout the entire system is naturally of paramount importance at Widnes, where the total weight of material dealt with per annum is approximately 750,000 tons. There are, of course, many other handling appliances of an interesting nature at Widnes, but the limitation of space prevents further reference to the subject in this article. Sufficient evidence, however, has been given to show the important influence of transport and economical methods of handling upon progress and development.

Official Report on Smoke Abatement

The stoppages of industrial work, owing to the coal strike of 1920, provided the Advisory Committee on Atmospheric Pollution, appointed by the Meteorological Office, with an interesting opportunity for obtaining information as to what proportion of the solids deposited at a given experimental station were due to smoke from factory chimneys. The Rochdale station was selected, a district which has the unenviable record of producing one of the heaviest deposits of those under examination by the committee. As a result of the investigations it was determined that approximately 66 per cent. of the matter collected was due to factory smoke. Of the remainder, 15 per cent. is estimated as dust and 19 per cent. as due to house smoke and other causes. In the eighth report of the committee just issued, this matter is dealt with at some length, and it is suggested, in view of these facts, that the greater part of the pollution should be capable of control by the town authorities. It was also established by other experiments that in spite of the town of Rochdale being flanked by many other manufacturing towns, no large proportion of atmospheric pollution by weight finds its way into the town from outside.

The body of the report deals with the records obtained monthly at the 31 gauges in the country during the twelve months ended March 31, 1922. It may be noted that the deposits are analysed, and that the deposit at Newcastle-on-Tyne contained the highest amount of tar and carbon, and Southport the most chlorine. On the average, however, St. Helens shows the most chlorine. Golden Lane, London, showed the most ammonia for the year under review, together with the least deposit of tar. Owing to the continued drought and the coal strike in 1921, the total deposits at nearly all stations were below the average.

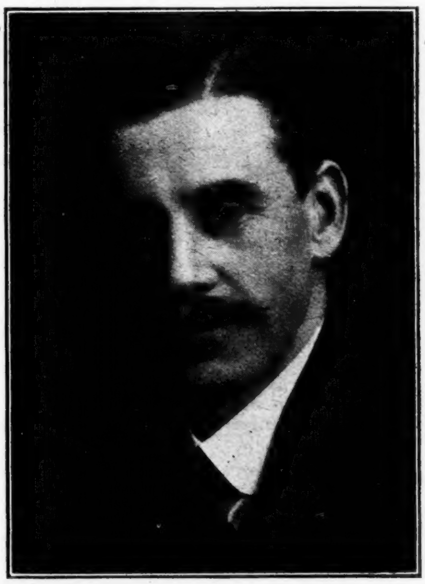
Research Fellowships

Mr. James R. Hubbard, a graduate of the University of Colorado, and Mr. Henry Eyring, a University of Arizona graduate, have been designated as research fellows for 1923-24 under the co-operative agreement between the U.S.A. Bureau of Mines, Department of the Interior, and the University of Arizona. The problems to be undertaken by Messrs. Hubbard and Eyring, respectively, are the "differential flotation of copper sulphides" and "a phase of the physical-chemical problem affecting loss in copper slag."

Mr. J. Arthur Reavell on American Industrial Conditions

Impressions of a Recent Tour

Mr. J. Arthur Reavell, managing director of the Kestner Evaporator and Engineering Co., Ltd., London, and chairman of the Chemical Engineering Group, who recently returned from a tour of 3,000 miles in the United States and Canada, during which he saw much of American engineering organisation, has brought back many interesting impressions, some of which he has been good enough to recount for publication in The Chemical Age. Though keenly interested in chemical engineering, as chairman of the Group, Mr. Reavell had no time to attend any meetings of the Institution of Chemical Engineers or to consult with the promoters of the movement in America. His tour was a strictly business undertaking, and was principally concerned with inquiries into industrial applications of Silica Gel, of which his company are the sole concessionaires for this country and the Colonies.



Mr. J. Arthur Reavell
(Chairman of the Chemical Engineering Group).

Silica Gel: Applications in Industry

Mr. Reavell, to begin with, gave a brief account of what the introduction of Silica Gel may mean to industry. "Silica Gel," he said, "is one of the adsorbents developed during the war for use in gas masks. The whole of the invention originated in research work done during the war by Professor Patrick, of the Johns Hopkins University. It was afterwards followed up and developed commercially by the Davison Chemical Company of Baltimore, and subsequently a separate company known as the Silica Gel Corporation was formed to run it. The Kestner Evaporator and Engineering Company are the sole concessionaires for Great Britain and the Colonies for the whole of the Silica Gel patents and all their industrial applications.

"What," Mr. Reavell was asked, "are the main industrial applications contemplated?"

"Ultimately," he replied, "the applications will be very numerous, as the properties and uses become better known, but the great immediate field for use is the refining of oils. Silica Gel is a selective adsorbent, and in the refining of oils such as petrol or kerosine it removes just as much of the sulphur as you wish to remove, without the loss of the other valuable ingredients which you wish to retain. It takes the place of the old acid and alkali process. In the case of paraffin, for example, for use in the home, treatment with Silica Gel removes the common trouble of smoky chimneys. Here are photographs showing chimneys very badly smoked where ordinary paraffin was used, while in the case of oil treated with Silica Gel the chimneys show hardly a trace of smoke. In the refining of petrol, again, it removes the sulphur and other impurities which cause the gumming-up of the valves of a petrol engine. You see here some remarkable results of what is known as the copper dish test. In America, in order to test petrol or benzol for use in motor engines, they regularly use this copper dish test, which is one of the most effective yet devised. In this case, a small quantity of ordinary petrol was placed in the copper dish and evaporated to dryness. At the bottom of the dish you can easily see a considerable deposit and evidence of corrosion. A quantity of petrol refined with Silica Gel was similarly placed in a copper dish, and the deposit is scarcely perceptible, there being absolutely no corrosion. The striking contrast between the condition of these vessels, which is obvious to the most inexpert observer, illustrates better than any elaborate description the remarkable results achieved by Silica Gel. Incidentally, I think that this copper dish test, which is so common in America, ought to be introduced in England. At present it is practically unknown here.

"In the same way Silica Gel may be used for the recovery of light oils from coke oven gases, and a much larger yield of benzol is thus obtained—at least 10 per cent. more than by the ordinary method of creosote oil and subsequent refining by acid wash and distillation. It has the further advantage of being a much cheaper process to operate than any I know of, and of not requiring the use of chemicals of any kind. The application is very simple. The Gel is blown through with the gas in a series of three vessels, so that the whole of the light oils and also any water is removed. The Gel is passed into an activator, which re-activates the Gel and distils the light oils, and in that way the Gel is available for use over and over again.

Benzol Recovery

"Ultimately, as I have said, the field for use must become very large as its scientific properties and commercial applications become known. In America the idea has certainly caught on, and numbers of plants are now going up. In this country I should say the first application would be largely in connection with benzol recovery and the purification of oils for the production of paraffins and petrols. Another use in America to which Silica Gel is being largely put is the dehydrating of air for blast furnaces and other industrial applications, and in this connection it is proving most effective. A very simple and highly efficient plant can be built for this purpose, and it is likely to come into very extensive use. There are also large possibilities in the refining of edible oils. What has been done in America in this one matter illustrates their readiness to spend freely on research. The whole of the laboratory work was done and large scale installations completed and tried out, as they say, before any attempt was made to sell anything. In that respect we have much to learn here. A series of patents has been obtained or applied for in every civilised country in the world, and my own confident view is that the changes to be brought about will be revolutionary.

Some General Impressions

"This," said Mr. Reavell, "was my sixth trip, and what has impressed me most this time is the enormous extent of the natural resources the American people have and also the way in which they take advantage of them. At the Davison Chemical Works, for example, at Baltimore, ships come right up to the works, and in addition to these deep sea advantages they have the most complete railway facilities, with the result that the amount and the cost of handling are reduced to a minimum. As against our little wagons they have trucks that take 10 ton loads. It may, as you suggest, be partly due to the fact that everything out there is on a larger scale than here; but I also think that the habit of mind has a great deal to do with it. If they want a thing, instead of putting up with something else, they just get it, and the result is a wonderful system of mechanical handling in every industry. When to this class of advantage you add their immense resources in raw materials, you realise how they can afford to pay such high wages and yet compete in the markets of the world. It seemed to me they were wasteful in the treatment of raw materials, but the explanation probably is that

they have such a wealth of them that our standards of value differ. It is always a surprise to visitors how they manage to pay such enormous wages—14 dollars a day, for example, for a labourer. They do it, I suppose, because they have such advanced labour-saving devices for the handling of raw and finished materials, and the men, who all believe in the largest output possible, are not afraid of labour-saving appliances.

Mass Production

"America," continued Mr. Reavell, "was perhaps the greatest pioneer in mass production. That enables them, as in the motor trade, to turn out goods at a remarkably cheap rate. At the same time, judged by our standards, their products are not as good as ours. When looking at an American plant I have heard Englishmen remark that it might suit American conditions but would not do for England. The standards are different. We build machinery to last a lifetime, and jolly good stuff most of it is; the American builds for five or perhaps ten years, and at the end of that time he scraps his plant and is thus able to take advantage of any improved designs.

"I did not meet any of the chemical engineering people," remarked Mr. Reavell, in reply to an inquiry, "but I saw a great deal of their engineering plants. My impression is that we have nothing to fear as regards either design or construction—certainly not in construction. I noticed nothing very remarkable in their systems of management, but they do set an example in one respect—I wish we in this country could get the confidence of the men as American employers do, and that British workmen could be made as keen as American workmen on producing maximum output, instead of so often trying to limit it. As in the past, I found everywhere I went the greatest willingness among manufacturers to tell one everything about their plant. They showed me their cost sheets and all sorts of information which here would be regarded as secrets to be carefully kept from the knowledge of others. They are on the right lines in this matter, because the result of pooling information in this way is to raise the standard of knowledge all round, and the manufacturer who gives something to his competitors gets much more in return. In England we are still handicapped by our exclusive and suspicious individualistic attitude. We are, however, improving, and I think in the matter of chemical engineering that the Group has done valuable work in inducing manufacturers and technologists to confer together on their problems and exchange experiences. You have already referred in THE CHEMICAL AGE to the prohibition system and its effect on industry. It may be an unpopular policy with us, but I am inclined, after what I saw and heard, to think you are right in predicting that it will produce a more sober, industrious, and trustworthy class of workpeople, and mark a distinct advance in industrial efficiency.

"Once more," Mr. Reavell remarked in conclusion, "I cannot speak too warmly of American hospitality and friendship. The two nations have so much in common that they are really one, and I think the increasing tendency among business men on both sides to pay periodical exchange visits must result in mutual advantage, and is therefore to be warmly encouraged from every point of view."

F. E. H.

Methods of Obtaining Industrial Oxygen

MR. T. CAMPBELL FINLAYSON's paper on "Industrial Oxygen," which was read at the first conference of the Institute of Chemical Engineers in June (THE CHEMICAL AGE, June 16, p. 642), has been published in a neat dark blue cloth cover by the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd., of 52, Grosvenor Gardens, London. It will be remembered that the object of the research dealt with in the paper was to find a cheap method of making industrial oxygen of about 60-70 per cent. purity at a cost of 1s. per thousand cubic feet. A large number of possible methods were investigated and found impracticable for various reasons, although one, based on the method of differential solubilities and known as the "Pressure Fractionation" process, was fairly promising. The publication of the work in a permanent form is a valuable record of research carried out for industrial purposes which may prove useful at some future date.

Standards for Chemicals and Alloys

To the Editor of THE CHEMICAL AGE

SIR,—In various journals from time to time have appeared articles and abstracts on standard samples and standard chemicals for use in analytical laboratories. On referring to as many of these as are available to him the present writer has found that they all relate to steel and iron analysis; no attempt seems to have been made to co-ordinate the far more complex analyses involved in non-ferrous and other analysis.

Now it seems that there is at least as much need for some co-ordination between other laboratories as there is between steel and iron analysts, more especially as a greater divergence of method is possible in non-ferrous and other work. It seems clear that a standardisation of methods is neither likely in the near future nor is it altogether to be wished, for method must always be largely a matter of experience and taste. There are chemists who can obtain accurate results with methods which would be of no use to others. For instance, no one uses the more cumbersome methods of Fresenius now, yet excellent results can be obtained by their means.

The divergence of reported analyses on presumably the same sample is sometimes very disconcerting, and, the sampling being good, must be the outcome of faulty methods. This difficulty could be overcome by the preparation of standard samples of known composition, their careful analysis by several analysts, and their distribution for standardisation of results.

Another source of error is the "pure reagent." The use of any standard chemical of unknown purity leads often to perpetuation of error. Manufacturers do not as a rule state the full analysis of their products on their labels, and though they often guarantee freedom from this or that impurity they will seldom state the percentage purity of their chemicals. The present writer has often gone to the tedious and lengthy procedure of purifying his own reagents, and has had good results, but the process is too wasteful of time. Of course, the purity of a reagent must to a certain extent depend upon the use to which it is to be put, and what is amply pure enough for one purpose will not do for another.

Happily certain chemicals can be obtained of extraordinary purity, such as cane sugar, oxalates, silver nitrate, and metallic silver, and from these many standards can be set up for use.

It seems to the writer that what is needed is a series of standard samples of pure chemicals of known and authentic purity and a series of standard alloys also duly authenticated. These should be obtainable by all laboratories. Of course, no one establishment could be expected to take on the whole burden of responsibility in this matter, and it seems that if each of a large number of laboratories undertook the preparation of one alloy or chemical and its sampling and distribution to a number of other laboratories for analysis, and if the reports were collated and a definite composition determined upon, a whole range of very useful samples might be at the disposal of each laboratory by the mere labour of preparing one and perhaps of analysing several.

This would also tend to bring the various laboratories closer together and facilitate communication between them on questions of equipment and even of method and organisation—a consummation devoutly to be wished.

The writer has long felt that the weakness of the profession lay in the disunion of its members. The commercial man is too apt to say that if he needs a different analysis of his product he has only to go to another chemist to get it, which is not good for him nor for us.

The question of prices charged for chemicals is a point to which the writer called attention in this journal (February 13, 1923), and would naturally arise as soon as some sort of co-operation existed between laboratories. It is with the belief that the time is ripe for some such community among laboratories that this note has been written, and if it provokes a response commensurate with the magnitude of the need which exists it will have served its purpose. The writer is prepared to do his part to the utmost of his small ability, and will be interested if the hospitality of these columns is afforded to those who would express their views.—I am, etc.,

REGINALD G. JOHNSTON,
Scientist in Charge.

Midland Laboratory Guild, Ltd.,
King Alfred's Place, Birmingham.
August 21.

The Aim and Function of the Chemical Engineer

By W. H. Coleman, F.I.C.

The author sets out in clear terms the essential function of the chemical engineer, emphasising the importance of the simplification of processes and insisting on the factor of cost as well as the factor of efficiency being taken into account.

MANY years ago Euclid taught that the shortest distance between two points is a straight line, and, although in recent times Einstein appears to have thrown some doubt upon the accuracy of this assertion, it remains for all practical purposes one of the most useful texts from which to preach a chemical engineering sermon.

Although it may seem presumptious to attempt to indicate the road to others who are more experienced, yet so strongly does the writer feel the force of the words quoted above when applied to chemical engineering that he dares, at the risk of an accusation of prolixity, to repeat the words in italics—*the shortest distance between two points is a straight line*—in the hope of keeping the underlying idea always in the mind of the chemical engineering profession.

Correlation of Operations

Every new machine, every new process, and every new piece of apparatus has its life history and its species history just as in Nature. The need for doing certain work or for making certain products arises, and if there is no existing appliance or system of work which can be used a new one has to be thought out. The chemist is able to provide information as to the raw material and qualities required in the finished product, and the chemical and physical steps by which the former is to be transformed into the latter. The plant manufacturer and the mechanical engineer can supply vessels and apparatus for containing the material under treatment and machines for moving it in the desired direction, and means for heating, cooling, and otherwise altering its condition, but it is the chemical engineer who must correlate the whole and arrange that the process goes forward from the beginning to the end without any hitch or friction; and to accomplish this he must keep in mind always the words quoted above.

The particular machine or apparatus, be it furnace, or still, or evaporator, or filter, etc., is generally when first invented of a somewhat crude type, and after it has been in use some little time many small additions and improvements are added to perform certain functions which were not obviously necessary at the start. As time goes on the number of these additions increases, and then is the time for the chemical engineer to make a thorough study of the process from both the chemical and engineering points of view, so that he may decide what he can suppress without injury to the product and with the advantage of reduction in cost not only of the apparatus itself but of the handling or working.

A Practical Illustration

A short account of part of the life history of one well-known process will perhaps help to fix the idea of the need of the straight line *motif* in all chemical engineering work. Most chemists are familiar with the process of obtaining carbolic and cresylic acids from coal tar and other kinds of creosote oil, but for our purpose we must begin at the beginning. It was found that by shaking together the creosote containing the phenols and a solution of a caustic alkali (soda was used on account of its cheapness), the phenol and soda combined forming a solution of sodium phenote which was immiscible with, as well as specifically heavier than, the residual oil, and separated on standing as a distinct lower layer. This was separated and decomposed by the cheapest form of a stronger and available acid, and for the purpose sulphuric acid was selected. In the early days the mixing of the creosote and the alkaline liquor was done by hand, the liquids being stirred by a paddle in a wooden tub, or vat, or an iron tank. After thorough but laborious stirring, the liquids were left at rest to settle and separate, and the sodium phenote liquor was subsequently drawn off into an open lead-lined pan. Here it was decomposed by the addition of the acid, again accompanied by vigorous stirring, and, after settling, the crude phenols were skimmed off the top by hand, much as cream is skimmed from milk. As the industry expanded, mechanical washers of various kinds replaced the hand stirring, and separation was effected by running off the lower layers through a pipe rather than by skimming; sulphuric acid was displaced by carbon dioxide, and many other alterations were introduced.

Having begun by stirring the creosote and soda together, it never occurred to anyone to question the necessity for prolonged mechanical agitation, and much time and energy were spent on designing and setting up elaborate mixing machinery—horizontal and vertical paddle blades, screw propellers, vortex producers, etc.—as well as a system of circulating the liquids by an external pump. All were tried, and continuous systems of agitation and extraction were evolved, each a little more complicated and requiring a little more attention and power, and with increased complexity providing more opportunities for mistakes in working and possibilities of breakdown, until, while experimenting with the pump circulating system, the writer found that circulation and mechanical agitation were alike unnecessary, and that practically all the phenols could be extracted from the creosote and other oils by the comparatively simple process of pumping the soda liquor on to the top of the creosote contained in a tall narrow vessel—a boiler set on end. The discharge nozzle for the soda liquor being some three to five feet above the surface of the creosote, the soda liquor splashes on to the top of the creosote, breaks up into drops, and settles through it and collects at the bottom, one passage being sufficient either to saturate the soda liquor or to extract all the phenol from the creosote, depending upon the relative proportions used.

A further simplification consisted in working in two stages, so that the first wash was always completely saturated with phenol, and the second took out the last traces from the oil and became the first wash of the next batch.

Still in the same connection, an elaborate system of fractional washing had been devised with the view of obtaining the phenol and cresols as separate products. The system necessitated a large number of tanks and very careful attention by the workmen and took much time. The invention of efficient fractionating columns, and especially the extension of the use of the constant temperature still head, allowed matters to be simplified: all of the tar acids were washed out together, and after decomposition and separation from the waste soda liquor were later on separated by fractional distillation, a process which not only gave a better product, but which was much cheaper when all things were taken into consideration.

It would be easy to multiply instances where a little careful thought has enabled the chemical engineer to simplify processes by cutting out unnecessary steps or by altering the scheme of working as the result of observation of the actual running of the process.

Efficiency Plus Cost

A word of warning may perhaps be uttered: it is to point out the danger of thinking too much of *efficiency*. It is admitted by the writer that to throw any doubt on the necessity for the highest efficiency seems dangerous heresy, but the worship of efficiency tends to become an obsession, and time, energy, brain power, and money are squandered in trying to reach the highest efficiency for particular types of plant and processes, entirely omitting to take any account of the *cost* of obtaining such efficiency.

The writer feels that he has been uttering what may seem a truism, but he is so strongly impressed with the necessity of broad views being taken, if we, in this country, are to retain the hold we have on chemical industry, that while we want all the research work and the brain power of both the chemist and the engineer, the chemical engineer must keep always in view the shortest road to his objective, and must be able to weigh up the advantages and disadvantages of any proposed divergence from the narrow path against its cost.

The rôle of the chemical engineer, then, is not a very high-sounding one; it is rather the more lowly occupation of taking the results and ideas of the chemist and the machines and appliances of the mechanical engineer, and so blending them that he adopts the simplest means available to attain the desired end, and he can only do this if he is first of all a chemist who can follow all the intricacies of the proposed series of

reactions and has sufficient acquaintance with engineering and, last, but not least, with works-manufacturing practice and the idiosyncrasies of the workman.

Summing up what has gone before, the writer would urge upon the chemical engineer, and especially upon those just entering the profession, the very great necessity of always keeping the individual machines and the flow sheets of any plant or process they may have to deal with as simple and straightforward as possible, and just as Dr. Abbot, of the old City of London School, insisted that to write clearly one must use the simplest and shortest words and expressions that would adequately express the idea sought to be conveyed, so the chemical engineer must keep the narrow path, the straight line, and the avoidance of complexity always before him.

Acid and Rust Proof Materials for Chemical Works

By Rex Furness

The chemical industry is always ready to avail itself of the science and art of the metallurgist, and it is encouraging to note the amount of attention which has been given in the last few years to the manufacture of acid and rust proof metals and alloys. The writer gives a description of the more important of these substances, and discusses the chemical properties which are demanded.

It is not sufficient to have satisfactory acid and rust resisting data in respect of metals for chemical plant construction in the absence of complementary information regarding their mechanical properties. In this connection, however, it is gratifying to find that increasing co-operation between maker and user is becoming more the rule. It is only by the development of such comprehensive investigations that advance can come. The example of the ferro-silicon acid-resisting alloys is pertinent, for it will be remembered how convincing were the data describing their acid-resisting qualities, but how great were the difficulties in casting, turning, and general application to plant construction, etc. The problems are not completely solved to-day, but great progress has been made, and with full and frank admission of inherent difficulties and a determination to overcome them much progress has been possible.

It is proposed to review in this article some of the important acid and rust resisting metals and alloys. Lead will not be discussed, nor will the many types of coatings be more than noticed. Many satisfactory coatings are known, both organic (such as paints, artificial resins, rubber derivatives, etc.) and inorganic (such as enamels, metal coverings, etc.). Among the latter must be mentioned such materials as galvanised and tinned plate, and especially electro-deposited coatings for metals liable to rust. Electro-deposition of copper, nickel, tin, and zinc in particular has had increasing attention paid to it, since extremely light-weight coverings can be applied in a perfectly uniform manner, whilst the conditions of deposition are not such as to modify the mechanical properties of the base metal upon which the coating is deposited. The problems and advantages associated with electro-deposited protective coverings are many, and bare reference can only be made here. The publications of the Faraday Society contain much that is of extreme value in this matter, and should be consulted.

Aluminium

Aluminium is available in almost unlimited amount to-day, most of the belligerent countries having erected large plants for its manufacture during the late war.

The metal is very useful in dealing with many acid solutions, although a great conflict of evidence is to be found in literature on this point. It cannot be used in contact with alkalis, whilst many salt solutions attack it under certain conditions. Thus, Smith states (*J.S.C.I.*, 1904, 475) that hot concentrated sodium chloride attacks aluminium, hydrogen being evolved and a basic chloride of the metal being formed. In dilute solution, however, a protective layer forms upon the metal. Nitric acid has been stated by the above writer to have little action upon aluminium when dilute or concentrated, provided heat be not applied. Trillat, however, states that attack at the air-acid boundary takes place even in the cold, but the resistance to attack can be increased by heating the metal first to 400–500° C. Similarly, Hale and Foster (*J.S.C.I.*, 1915, 464) note that dilute nitric acid has a slight action upon aluminium in the cold.

The careful and exhaustive experiments of Seligman and Williams (*J.S.C.I.*, 1916, 88 and 665, and 1917, 409) merit special attention, since they embody a survey of previous work. In connection with the action of nitric acid upon aluminium, it is found that temperature is the most important consideration, a rise of 10° C.—in certain ranges of temperature—increasing the amount of attack by 100 per cent. Concentration of acid is again an important factor, acids of 20–40 per cent. strength having most action, whilst an acid, say, of 94 per cent. concentration has little effect upon aluminium. Thus, the metal can be employed in contact with cold concentrated acid with comparative safety, but its employment is not advisable if hot strong acid is to be used. In certain circumstances, cold dilute nitric acid may be employed in aluminium vessels, but hot dilute acid rapidly acts upon aluminium apparatus.

The effect of the purity of the metal upon its capacity for resisting acids, etc., has been much in dispute, but Seligman and Williams conclude that in general pure aluminium is more resistant. Again, the physical state of the metal determines to some extent the resistance to reagents, the amorphous variety being more easily attacked than the crystalline. Mixed nitric and sulphuric acids react upon aluminium more readily than does nitric acid itself. The utility of aluminium in the construction of apparatus to contain organic acids has also been much in dispute, in spite of the fact that aluminium stills have been successfully employed in the rectification of acetic acid. Seligman and Williams have thoroughly examined the action of organic acids upon the metal, and find that the amount of water in the acid is of greatest moment. Thus, in certain conditions, 99 per cent. acetic acid has only one-tenth the action of 90 per cent. acid. Again, the last small amounts of water as 100 per cent. acid is approached have an entirely disproportionate effect upon the resistance to attack of aluminium in contact with it, and the last 0·05 per cent. increase in purity increases the attack one hundredfold. Similarly, 99 per cent. butyric acid has little action upon aluminium even at boiling point, but pure butyric acid has a rapid extensive action. The presence of air has little influence upon the rate of attack of acetic acid upon aluminium—a point hotly contested in the past—but, if local action is started by reason of impurities in the metal, physical state, etc., this action is less pronounced in the absence of air.

The value of the metal for use with the higher fatty acids is set beyond question by Seligman and Williams, for it was found that a mixture of stearic, oleic and palmitic acids had no action upon aluminium up to 270° C. Action commences at this temperature, and invariably occurs above 300° C. Curiously, if action has once been started by heating to this high temperature, it will continue even though the temperature be reduced to 100° C. As in the case of the lower fatty acids, perfectly anhydrous acids attack aluminium readily. The influence of added salts such as chlorides, bromides, iodides, etc., upon the readiness of attack of the organic acids is reported fully in the above-mentioned papers, which give an insight into many specific problems, and should be referred to in this connection. It should be noted that previous observers had noticed the action of aluminium upon the higher fatty acids at raised temperatures. Thus, Easterfield and Taylor (*J. Chem. Soc.*, 1911, 2,298) found that stearone was formed by passing stearic acid over aluminium heated to 300° C., aluminium stearate first being produced. Therefrom it is obvious that the higher fatty acids should not be treated in aluminium vessels at such temperatures.

The progress of metallurgy in respect of aluminium has been marked, and many of the controversial points regarding the influence of impurities upon the behaviour of the metal need no consideration to-day. It is generally admitted that pure metal is much more resistant than impure, and

that the method of treatment has some effect. Thus, hard-rolled aluminium with a highly polished surface is quite distinct from its behaviour to cast aluminium. Pure aluminium, however, suitably worked according to the best modern practice, is very useful in many cases, such as have been discussed above, and it is of interest that aluminium linings for synthetic acetic acid converters were reasonably successful. Here the powerful influences of a gradually increasing concentration of acid, presence of air and moisture, a changing "air-acid" boundary, etc., were to be contended with as well as a raised temperature.

"Armco" Iron

The so-called "Armco" iron which has been manufactured under licence in England since 1913 is an extremely pure form of iron, being guaranteed to contain at least 99·84 per cent. of iron. With the reduction of impurities, especially manganese, to less than 0·2 per cent., the resistance of the metal to corrosive influences is enhanced. If segregated impurities are to be considered as one of the causes of corrosion, it is clear that "Armco" metal will have pronounced superiority to, say, mild steel, the cheapness and large production of which has contributed to the general disappearance of many of the older forms of relatively purer iron. Many examples of the resistance to corrosion of structures of pure iron are to be found, and the classic instance of the pillar at Delhi, which has resisted atmospheric influences for so many centuries, may be quoted. This pillar analyses a minimum 99·72 per cent. iron, and is, therefore, less pure than every commercial batch of "Armco" iron. The ductility, toughness and fatigue endurance of "Armco" iron are of high order, and in this respect the anti-rusting qualities of the metal are not obtained at the expense of mechanical properties, as is so often the case with corrosion-resisting alloys.

The value of "Armco" iron to the chemical industry is not yet thoroughly appreciated, but there will be found many instances where the superior anti-rusting qualities of the metal will be of great service. Figures in this connection show the superiority of "Armco" iron over mild steel, thus: Plates constructed of 16 gauge metal, and 12 inches square, were exposed to atmospheric influences for a period of 28 months. Mild steel lost 4·86 oz., whilst "Armco" iron lost 2·15 oz. Moreover, in the case of the latter metal, no pitting was to be observed, and cleaning of the plate disclosed a perfect surface, in strong contradistinction to that revealed in the case of the mild steel plate. Similarly, although "Armco" iron is not to be described as an acid-resisting metal in the sense that ferro-silicon, for instance, is known, it demonstrates marked superiority to acid corrosion as compared with steels, cast irons, etc. Thus, Stead reports experiments in which the action of 4 per cent. sulphuric acid upon "Armco" metal and upon a Bessemer dead soft steel were studied. In 48 and 90 hours' tests the relative amounts of corrosion of the two metals were respectively 0·5 and 0·72 gms. per 100 sq. cms. exposed surface, and 3·7 and 7·9 gms. Hence, not only is "Armco" iron much less attacked than the Bessemer dead soft steel, but the rate of attack diminishes with time of exposure. This is explained by the fact that the surface of such steel is purer than the bulk, and, therefore, when this surface is removed, corrosion is possible at increased rate. With "Armco" iron the homogeneous pure metal does not conduce to such accelerated attack.

The possibilities of the application of "Armco" metal in the manufacture of chemical plant, as well as in structural work and in wire and cable production, will be watched with interest, and many applications where violent reagents do not come in contact with the metal should suggest themselves as possible, "Armco" iron replacing cast and wrought iron and steel.

Ferro-Silicon

The ferro-silicon alloys have been known for some considerable time, but until quite recently they found relatively little application in industry on account of the difficulty in working the alloys in the foundry. Their acid-resisting properties were unquestioned, but they were brittle and difficult to machine. Shrinkage in casting was a very noticeable feature and was the seat of many difficulties in the attempted construction of large pieces of apparatus. Thus the size of castings in ferro-silicon alloy was limited. The alloy, moreover, possessed a much less tensile strength than the irons and steels.

Much disappointment was naturally engendered when, after the manifest difficulties of construction had been surmounted, the internal strain in the alloy caused almost immediate fracture and necessitated "scrapping." It is, however, gratifying to record great advances in the metallurgy of the iron-silicon alloys, and such products as Duriron, Ironac, Elianite, Narki, Tantiron and Metallire are available in many types of apparatus which through efficient foundry practice are reliable in use. More uniform thickness has been possible of achievement in casting, better designs are worked out, sharp corners are avoided, and large flat surfaces are no longer in evidence, but corrugations are cast and breakages are rare. Indeed, Matignon (*Chem. et Ind.*, 1919, 2, 1283) states that all the problems of the foundry have been solved, and that the ferro-silicon alloys are available for apparatus construction in a wide variety of forms.

Apparatus such as coils, retorts, autoclaves, distillation columns, condenser tubes, containers for acid transport, valves, taps, centrifugal pumps, agitators, etc., have been successfully manufactured and used in works practice. In particular, apparatus of ferro-silicon has been applied to synthetic nitric acid production—pipe-lines, column apparatus, concentration vessels, pumps, etc.—whilst waste nitrating acid has been treated in ferro-silicon alloy apparatus with every satisfaction. Ferro-silicon alloys containing a low percentage of silicon, say, about 3–5 per cent., are not very brittle and give good castings without extraordinary precautions, but, on the other hand, have little acid-resisting value. Alloys containing 16–18 per cent. of silicon are much more difficult to cast successfully and machine, etc., but are highly resistant.

The manufacture of ferro-boron alloys has been effected, but these alloys have in general a lower resistance towards acids than ferro-silicon alloys, whilst little advantage in mechanical properties is observed. It is of interest, however, to refer to a recent patent (Walter, British Patent, No. 143553) in which it is stated that the hardness and brittleness of iron-silicon alloys is reduced if a small percentage of boron be incorporated. For instance, if 0·3–0·4 per cent. of boron be added to an alloy of iron and silicon, 85 : 15, the resulting alloy can be turned, drilled, filed, etc., with excellent results. It has been claimed also that a ferro-silicon alloy is now available which is resistant to the action of hydrochloric acid, but details in respect of this alloy are not so extensive as in the case of the older alloys, whose use was never delayed by any lack of appreciation of their resistance to nitric and sulphuric acids in particular, but to their lack of strength, their brittleness, and the enforced limitation of apparatus design, etc. The claims of the manufacturers of these alloys, which have proved themselves in recent years as worthy of acceptance by the chemical industry, have only been made possible by an appreciation of the fact of the original disadvantageous properties of the ferro-silicons. The determination of manufacturers of special alloys to take an over-all view of the matter, and not be content to "push" their goods on the basis of one specific property, is becoming much more general, but there are still instances of the latter class to be found. In their own interests, as well as that of the industry in general, it behoves such metallurgists to adopt the policy which has given success to the ferro-silicon makers.

Alloys Resisting Oxidation

Metallic structures which will resist oxidation at high temperatures, and which will nevertheless retain their strength, are of great interest to the chemical industry. Many metallurgical processes as well as purely chemical processes require externally heated apparatus which is therefore liable to extensive oxidation after a period of time—unless, of course, a perfectly maintained reducing atmosphere can be economically produced.

Several chromium-nickel steels have been used of recent years, and a number of manufacturers have published figures showing the retention of strength of the alloy at high temperatures, comparison being made with other steels and alloys. There is, however, insufficient evidence as yet available to speak definitely upon the question of ease of working and general applicability, etc. A few claimed successes may, however, be shortly indicated. Krupps made an alloy steel

containing 10–18 per cent. of chromium and a little nickel. This was claimed to be a valuable structural steel. Amongst others of this firm's manufactures the alloy containing 18–40 per cent. Cr. and 5–20 per cent. Ni. may be noted. Resistance to nitric acid and to oxidation at high temperatures were stated to be possessed by this alloy steel. A similar alloy has recently been patented by the Cleveland Brass Manufacturing Co., U.S. Patent No. 1389133. The alloy contains 15–40 per cent. Cr. and 1–15 per cent. Ni. These alloys are claimed to be non-oxidisable even at 1,000–1,100 C., even if subjected to repeated heating and cooling. Whether they are suitable for the construction of more or less complicated forms of apparatus is not clear.

Reference may be made in passing to the intensified production of the rustless and stainless steels, which are best constituted of low carbon chromium steels. Advances in the reduction of the carbon content have been made, and it is claimed that low carbon chromium steel can now be cheaply produced. Such materials, of great value in industry, are not of use in high temperature work as in the case of the chromium nickel steels referred to above.

Light Alloys Resisting Corrosion

Much progress has been made in the manufacture of light alloys for aircraft construction since the first "Duralumin" was introduced. The so-called "Y" alloy—an aluminium alloy containing 4 per cent. of copper, 2 per cent. of nickel, and 1·5 per cent. of magnesium—is a valuable metal. It possesses considerable rust-resisting qualities under the conditions of its chief application, namely, aircraft construction. There are, however, many problems which centre around the working of such light alloys, and anti-corrosion properties may have to be sacrificed to better mechanical strength.

It has only been possible here to indicate a few of the rust and temperature resisting alloys and alloy steels, whose number is legion. Many excellent types exist, but their general acceptance in industry can come only as a result of intensive efforts on the part of manufacturers to standardise and cheapen their products, and in many cases to demonstrate a greater willingness to co-operate with the chemical engineer and frankly to admit and help to overcome several important mechanical difficulties.

The Institution of Chemical Engineers

Its Origin, Progress, and Aims

Less than two years have elapsed since the question of the foundation of an Institution of Chemical Engineers was seriously taken up. Already there was in existence "The Chemical Engineering Group," a purely educational body which has done and will still do valuable work in arranging for the discussion of practical problems in chemical engineering and in promoting exchange of ideas and experience. Some of the more prominent members of that Group conceived the idea of establishing a qualifying association, and the Institution of Chemical Engineers was the direct result. More than a hundred persons interested in chemical engineering readily responded to the call of Professor J. W. Hinchley, of the Imperial College of Science and Technology, to attend a meeting at the Engineers' Club, London, on November 9, 1921, to consider a proposal to establish an Institution of Chemical Engineering. The chair was occupied by Sir Arthur Duckham, an animated discussion on the advantages of such an association took place, and a resolution for formation raised no obstacle.

A substantial and influential membership was assured from the outset, and the provisional council, operating under the chairmanship of Sir Arthur Duckham, with Mr. W. J. U. Woolcock as vice-chairman, held a score of meetings in which the basis and scope of the new organization was thoroughly canvassed, and a programme embracing a progressive policy finally was put forward.

In order to give the association a more influential status, incorporation was decided on. On December 21, 1922, advantage was taken of the provisions of the Companies Act of 1908–17, and the institution was incorporated as a company not for profit, limited by guarantee, and not having a capital divided into shares. The initial corporate meeting of the newly-formed institution was held on March 14, 1923, under the presidency of Sir Arthur Duckham, who was supported by about fifty members. Considerable progress was then reported, and there was a consensus of view as to a useful future for the organization.

Council and Officers

At the first annual general meeting held on June 8, 1923, Sir Arthur Duckham announced to a large attendance of members that a ballot for the first council had resulted as follows: Mr. H. J. Talbot, B.Sc., A.R.C.S., Mr. J. Arthur Reavell, M.I.M.E., Mr. C. S. Garland, M.P., B.Sc., A.R.C.S., Mr. W. B. Davidson, M.A., Ph.D., D.Sc., Sir Alexander Gibb, C.B., Mr. W. Macnab, F.I.C., Colonel Sir F. L. Nathan, K.B., Mr. James MacGregor, Mr. W. Newton Drew, Mr. A. R. Warnes, Mr. R. C. Browning, B.Sc., Mr. A. L. Booth, and Mr. E. R. Randell, A.I.C., F.C.S.

It was stated at this meeting that the existing honorary officers had been nominated for election, and by a unanimous vote they were placed in office for the ensuing year: President, Sir Arthur Duckham; vice-presidents, Dr. Charles Carpenter Mr. K. B. Quinan; honorary treasurer, Mr. F. H. Rogers, M.I.M.E.; honorary secretary, Professor J. W. Hinchley; assistant secretary, Mr. A. C. Flint, who is also assistant secretary of the Chemical Engineering Group.

As a temporary measure, offices were occupied at 166, Piccadilly, London, by the courtesy of the Association of British Chemical Manufacturers, and for a while the business was done there. But at length the Council arrived at the conclusion that the Institution, which had continued to expand, was of sufficient importance to justify the establishment of a home of its own. Thereupon arrangements were made for the rental of a suite of rooms in Abbey House, Westminster, and on April 25 last the association moved into occupation. The first meeting of the Council was held in the Board room on July 4, when committees were appointed with power to deal with the various matters which for the present, in their consolidated form, illustrate the policy of the organization.

The original General Purposes and Finance Committee is formed by Sir Arthur Duckham, Mr. W. J. U. Woolcock, Mr. J. A. Reavell, Mr. James MacGregor, Mr. E. L. Randell, Professor J. W. Hinchley, Mr. F. H. Rogers, Mr. C. S. Garland and Mr. H. Talbot.

The Nomination Committee includes Sir Arthur Duckham, Mr. J. A. Reavell, Mr. H. Talbot, Dr. W. B. Davidson (Newcastle-on-Tyne), Sir Alexander Gibb, Professor J. W. Hinchley, and Mr. C. S. Garland, with the following additional members: Dr. E. W. Smith, Dr. W. P. Joshua (A. Boake-Roberts and Co., Stratford, S.E.), Captain C. J. Goodwin, Mr. F. A. Greene, and Mr. E. A. Alliott.

The Educational Committee is composed as follows: Sir Arthur Duckham, Mr. C. S. Garland, M.P., Sir Alexander Gibb, Colonel Sir Frederic Nathan, Mr. W. Newton Drew (Thorncliffe Ironworks, near Sheffield), Mr. R. G. Browning, Mr. F. H. Rogers, and Professor J. W. Hinchley. The corresponding members are Mr. James Macleod (Lenzie, Dumbartonshire), Professor Weaver (University of Cape Town, South Africa), Mr. K. B. Quinan (Cape Province, South Africa), Professor J. K. Wilkinson (The University, Johannesburg), Mr. N. E. Rambush (Stockton-on-Tees), and Mr. J. H. Young (Maryhill, Glasgow). The additional members are Mr. W. J. Gee, Mr. A. Cottrell (Edinburgh University), Dr. E. W. Smith, Mr. F. R. Tunks, Mr. F. A. Greene, and Mr. W. A. Frayworth (State Laboratory, Bhopal, Central India).

The Publication Committee consists of Mr. A. Baker (Gravesend), Mr. H. J. Pooley, Dr. M. W. Travers, Mr. E. A. Alliott, Mr. S. G. M. Ure and Mr. M. B. Donald.

The Institution's Programme

To Mr. T. C. Finlayson, B.Sc., was awarded the distinction of presenting the first of the series of scientific papers to be

read before the members of the Institution, and the occasion was the first annual meeting. Mr. Finlayson's subject was "Industrial Oxygen," and his object was to give an account of his investigation into the possibilities of obtaining oxygen at a cheaper rate than that at which it is at present available. The facilities for research were afforded to Mr. Finlayson by the Development Section of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., and the paper, already published separately, will be included in the first volume of the Transactions of the Institution, which virtually will cover the operations of the current year.

The programme of the autumn session will, it is confidently expected, include several important scientific papers, and it is hoped that the discussions will prove of more than passing interest to members of the chemical engineering profession. The programme is still under the consideration of the Education Committee, whose list of selected papers will in due course be placed in the hands of the members.

At the present time the membership of the Institution of Chemical Engineers exceeds two hundred: almost daily, communications are being received from applicants who desire to become members, associate members, graduates, or students. This part of the work is keeping Mr. C. S. Garland, M.P., the honorary registrar, and the other members of the Nomination Committee fairly busy each month, as all nominations have to be reviewed by them prior to submission to the Council for sanction for enrolment.

It was a graceful tribute to his services as an organiser that Mr. W. J. U. Woolcock, the General Manager of the Association of British Chemical Manufacturers, should have been the first honorary member. But the Council evidently are not unmindful of the fact that in chemical engineering there are men of distinction belonging to other nationalities, for, bracketed with Englishmen on whom honour is conferred, are M. Paul Kestner (France), Prince Gionori Conti (Italy), Dr. Ruttan (Canada), and Professor Lewis (United States). The inclusion of distinguished foreigners on the honorary roll is bound to awaken in countries beyond the seas an additional interest in the Institution's operations; and it may reasonably be assumed that such affiliation as that which already has marked the career of the Institution will develop international exchanges of scientific views.

Reviews

HANDBOOK OF CHEMICAL ENGINEERING. Prepared by a Staff of Specialists. Edited by DONALD M. LIDDELL. New York: McGraw-Hill Book Co., Inc. 2 Vols. Pp. 1,008. £2.

The title of this book brings to mind the excellent work of George E. Davis published about 25 years ago and now, unfortunately, out of print, but there is little resemblance in the contents. It consists of a number of chapters written by different authors on certain special features of chemical industries selected for description. As stated in the preface an attempt is made "to throw into prominence the basic principles," and usually a number of specific industrial applications are stated. About thirty writers have been engaged in its production, and the book suffers somewhat from a lack of co-ordination of ideas and from differences in point of view.

To the practising chemical engineer the contents are rather disappointing, for the particular subjects which, for him, need the greatest amount of elucidation are either rather meagrely treated or neglected. Those which are treated best have already become part of the subject of metallurgy. On the whole the writers are not chemical engineers in the ordinary sense of the term, but specialists in the particular subjects upon which they have written. While this fact is a useful one from many points of view, the chemical engineering outlook is often completely missing.

The excellent chapter on "Power Generation and Transmission," for instance, written by an expert mechanical engineer, suffers from this defect, while other chapters might be a part of a book on chemistry. The articles on the "Handling of Liquids, Solids and Gases," and the treatment of solids by "Crushing, Grinding, Screening, Separation, Concentration, etc." give excellent information and are very satisfactory, indeed. The chapters on "Leaching and Dissolving," "Evaporation" and "Crystallisation," subjects of the greatest importance to chemical engineers, are rather short and contain little quantitative information but many excellent practical notes. "Pyrometry" is treated very fully and well; it receives 50 per cent. more space than "evaporation!" The subject of "Mixing and Kneading" is well treated, mainly in reference to the food industries, but the subject of "Fermentation" is of necessity inadequately treated, and is hardly suitable for inclusion in the book. The chapters upon "Distillation" are extremely interesting and up to date, and "Refrigeration" is usefully discussed. "Oxidation and Reduction," "Electrolysis," "Catalysis," "Colloid Chemistry," "Metallurgy of Zinc, Lead, Copper, and Iron," occupy 150 pages. "Radio-Activity," "Rare Metals" and "Rare Gases," occupy 69 pages. It is obvious therefore, that over 200 pages of the book are devoted to subjects which might be omitted, while corrosion and lubrication are almost neglected. The subject of "Materials of Construction" is inadequately treated; several most important materials—lead, aluminium, stoneware, porcelain, etc.—are not even mentioned. A chapter on "Cements and Glues" is very useful, and contains many suggestions and recipes of value. Short chapters on the "Theory of Plant Location and Design" and "Methods of Financing" complete the work.

We are grateful to Mr. Liddell, who states in his preface that he sends forth the book "with much misgiving," for a useful and interesting work, but hope that he will alter the planning and modify the scope of the second edition.

J. W. HINCHLEY.

THE FORMATION OF COLLOIDS. By THE SVEDBERG. Monographs on the Physics and Chemistry of Colloids. London: J. and A. Churchill. Pp. 127. 7s. 6d.

This book is the first of a series of monographs on the chemistry and physics of colloids promised by Professor Svedberg. It gives, as indicated by the title, an account of the formation of disperse systems. This account is very complete and deals with a much wider range of phenomena than is usual in text books on colloid chemistry. Thus the author treats very fully of the formation of disperse systems *in vacuo* and in gases. The formation of disperse systems in liquids and solids is divided into the two classes of (*a*) condensation processes and (*b*) dispersion processes. The book contains full literature references and author and subject indexes. It is an authoritative work of high scientific value, which everyone interested in the subject of colloids must possess or have access to.

F. G. D.

THE CHEMISTRY OF COMBUSTION. By J. NEWTON FRIEND, D.Sc. Chemical Monographs edited by A. C. CUMMING, D.Sc. London: Gurney and Jackson. 1922. Pp. 110.

This book is the outcome of a series of lectures delivered to senior students at the Birmingham Municipal Technical School in the session 1920–21. Although it does not go into the subject at all deeply, and omits all reference to the thermodynamical and equilibrium aspects, an interesting sketch is given of certain investigations on the *process* of combustion, particularly of gases. Thus, amongst others, the researches of Baker, Dixon, Smithells, Bone, and Wheeler are dealt with. The book is provided with a bibliography and notes, but the name of Haber does not appear therein.

F. G. D.

LES ISOTOPES. By Dr. A. DAMIENS. Paris: Gauthier-Villars et Cie, Quai des Grands-Augustins 55. Pp. 118. 12fr.

This is a review intended for the French scientific reader of the present state of knowledge with respect to isotopic elements, and deals with the subject comprehensively yet concisely. A foreword is printed by Professor Jean Perrin, of "colloid" fame.

WAVE-LENGTH TABLES FOR SPECTRUM ANALYSIS. Compiled by F. TWYMAN, F.Inst.P. London: Adam Hilger, Ltd. Pp. 116. 7s. net.

In this book will be found a useful series of tables of wave-lengths of the spectrum lines of different elements, together with explanatory matter, and references to standard works dealing with spectrum analysis.

Random* Reflexions by a Random Reader.—(II)

The Cambridge Week: The Reports

A Babylonish Dialect,
Which learned Pedants much affect;
It was a Party-colour'd Dress
Of patch'd and py-ball'd Languages:
'Twas English cut on Greek and Latin,
Like Fustian heretofore on Sattin.
It had an odd promiscuous tone.

Professor J. W. McBain: The study of soap solutions and its bearing upon colloid chemistry.

Dr. E. K. Rideal: Recent developments in contact catalysis.

Professor J. F. Thorpe and Dr. C. K. Ingold: Some new aspects of Tautomerism.

Professor F. Gowland Hopkins: The mechanism of oxidation in the living body.

Mr. William Barlow: Structural cystallographic models.

The reports have been in a large part reprinted in *Blue Bits*† but without comment, though on subjects which should raise a papistical thirst for more in the throats of all good chemists. Ordered well in advance, unfortunately they were not ready in time for distribution before the meeting—an error not to be repeated—so that discussion of the findings was scarcely possible, even in private.

Written in a "Babylonish Dialect," they are certainly all pervaded by "an odd promiscuous tone," apparent even in the titles. For what is *Colloid Chemistry?* What is *Contact Catalysis?* What is *Tautomerism?* Cut upon Greek, they are truest fustian. Still—

Whoever thinks a fautless piece to see
Thinks what ne'er was nor is nor e'er shall be.

As to *Colloid*, in our *Latham-Johnson* (1882) we read: "Greek κόλλον = glue. This is perhaps the newest word in the dictionary. It is a name given by the present Master of the Mint to a series of combinations represented by the Hydrate of Alumina, which are of a gelatinous rather than a crystalline appearance."

Such definition is not easily bettered but let us note in passing that Colloid is a substantive and that it is wrong for a chemist at any time to reflect upon chemistry—to qualify it in any way—unless it be desired to put money into the legal purse. We may never forget the Babelonian confusion wrought in our camp by the heathen in their vain wrangling over the character of things they cannot understand—to wit, the honest word Organic; nor by the unnecessary qualification of a certain section of the chemists' work as Physical, wherein is no more—nay, less—physics than in the ancient practice of weighing and measuring. An' we be not mistaken, the day approacheth when it will be openly said that "Colloid Chemistry" is just Fudge Chemistry. The opinion is not our own alone; it runs in the U.S.A. "As long as chemists continue to believe in the existence of a special colloid chemistry differing from the chemistry of crystalloids, it will remain impossible to explain the physical behaviour of colloids in general and of proteins in particular." Such is the judgment pronounced by Jacques Loeb, one of the few men of the day to work with consideration.

* This adjective was sorbed in the press of the former article.

† We give this title "for short" to the official organ of the Industrious Chemists and Fellows of the Society for the Propagation of Christian Names among Chemists, all good Californians who, when not dining out, disport themselves with Dottes and (oh, fie!) loose blushing Electrons or in chasing Oughts and Crosses about chains of combinations. When they find time for the serious practice of the true art of Chemistry in the laboratory is not on record; indeed, rumour hath it that a machine for grinding out their fancy formulæ, like unto a praying wheel, is now mostly preferred to the test-tube and stirring-rod, wherewith those mighty men of old, to wit, Hofmann and Baeyer, once wrought so cunningly and well.

"If we are to have a renaissance of art, there should be a complete standing aloof from the academic system," wrote Samuel Butler, in *Alps and Sanctuaries*. "Academies," he says, "will bring out men who can paint hair very like hair and eyes very like eyes but this is not enough. This is grammar and deportment; we want wit and a kindly nature and these cannot be got from academies. We want less word painting and fine phrases and more observation at first hand. Every [worker] should be at once turned out if he or she is generally believed to have tried to do something he or she did not care about trying to do [the fate of most modern research students] and anything should be admitted which is the outcome of genuine liking."

We may well apply this to the art of Chemistry—its renaissance is long overdue and it were well to begin in the colloid region, as it is here that life enters in, though at present there be no life in its treatment.

As to *Contact Catalysis*, the dictionary is clear as to catalysis and that contact is implicit in the word.

"In chemistry, action of one body on another by contact, rather than that which is accompanied by change on both sides. . . . An interesting class of decompositions [in those days, syntheses were not yet thought of] . . . referred by Berzelius to a new power or, rather, new form of the force of chemical affinity. . . . A body in which this power resides resolves others into new compounds, merely by its contact with them or by an action of presence, as it has been termed, without gaining or losing anything itself."

This from *Graham's Elements of Chemistry*, once a standard work. Graham, we know, was not only an honourable man (not sufficiently consulted by the present generation) but one who thought deeply and wrote clearly, even on colloids. The Cambridge reporter evidently has no consideration for authorities. What meaning shall we to-day associate with *Catalysis?* In the report under notice the term is obviously used as the synonym of chemical interchange—and we know that the author of the report is part father of a treatise on Catalysis, throughout which the term is used thus generally. This conception also runs in the U.S.A., where Professor Wilder D. Bancroft is the anointed apostle of the indeterminates, who vainly await a sign. His attitude and that of the school generally was ineffectually challenged last year at Glasgow in the irreverent Messel Memorial lecture which so shocked the industrious chemists assembled in that city of piety, where Graham once ministered. Berzelius, in coining the term, certainly intended it should be applied specifically, not to all cases of chemical interchange. It is for us, then, to agree what limitation shall be placed upon its use.

Lastly, we come to *Tautomerism*—not only what a writer elsewhere calls a horrid, un-English word but one with no proper guts in it. Not in the dictionary, it can only be interpreted by analogy—by comparison with *Tautology*, which is derived from the Greek ταὐτολογέω = I repeat the same word or thing. Tautomerism may therefore be taken to mean the *repetition* of the same part or form, which certainly is not the implication intended. The cases considered are those of easily reversible isomeric change, which Berzelius—a thoughtful mind, always in advance of his generation—presciently included under the apt term *Metamerism*, all but equivalent to metamorphism, which, in fact, might well be used by chemists were it not expropriated to the service of geology. The reporters evidently have made little attempt to consult authorities and consider their words. The young men of to-day pay no heed to the serious literature of the past—the academies only favour text-books. Yet, as Samuel Butler tells us, "The only thing that can produce a deep and permanently good influence upon a man's character is to have been begotten of good ancestors for many generations—or at any rate to have reverted to a good ancestry—and to live among nice people." What young chemist to-day lives with either Berzelius or Graham? Examiners forbid! *Belesenheit* is a virtue of which few can now be accused. How many know their Pope and heed such advice as the following?

Trust not yourself but, your defects to know,
Make use of ev'ry friend—and ev'ry foe.
A little learning is a dang'rous thing;
Drink deep or taste not the Pierian spring:
These shallow draughts intoxicate the brain
And drinking deeply sobers us again.
In fearless youth we tempt the heights of arts,
While from the bounded level of our mind
Short views we take, nor see the lengths behind;
But more advanced behold with strange surprise
New distant scenes of endless science rise.

We well remember being in Vice-Chancellor Bacon's court, years ago, when a young ward in Chancery was brought before him to be spoken with. After a long, whispered conversation, turning to the counsel who accompanied her, the learned Judge said: "Mr. So-and-So, the lady does not know her mind; when the lady knows her mind let her come again to speak with me." Very irate, the young lady exclaimed, "But I do know my mind." "Mr. So-and-So," repeated the Judge, "the lady does not know her mind." She had not been properly instructed as to the terms in which she should address him. So it is with the young chemists of to-day. However they may have been instructed, their minds (if they have any) are not clear and they will not take the trouble to clarify them; they but lisp shibboleths; they have no respect for past generations and do not realise how superficial and limited is most of the modern work in its outlook and objects. *Abstracts* have put an end to reading; the multitude of publications has made close study impossible.

The International Report of the future must be free from all terminological inexactitudes—every phrase must be thought out, clear and convincing in style. In no other way can an understanding be arrived at and community of thought established among scientific workers of all nations.

The four Cambridge reports are truly tautomeric, inasmuch as one subject pervades them all—some form of chemical interchange. They need but to be equilibrated to make clear one and the same great lesson. The synthesis will be no easy one to effect and must be preceded by much analytic study of a perplexing admixture of verbal inaccuracy, forced assumption, and small regard of fact. We shall begin with the Sope-mystery.

Why Formaldehyde was Removed from the List

Full Text of the Referee's Award

As briefly stated in THE CHEMICAL AGE *of last week, Mr. Cyril Atkinson, K.C., the official referee who held an inquiry under section* 1, *sub-section* 5 *of the Safeguarding of Industries Act into a complaint that formaldehyde had improperly been included in the list of dutiable articles, has ordered its exclusion from August* 20. *The following is the complete text of the award:*

THE question in this reference is whether formaldehyde is properly included in the list of articles dutiable under the Act. The case has troubled me a good deal, because it raised three distinct questions as to every one of which I was asked to depart from principles I had already laid down for my guidance. I do not say that I regard myself as bound by what I have said before. If I am satisfied in the light of further evidence that what I have said should be modified I will be quite ready to act on that conviction. But unless and until I am satisfied that the evidence given and accepted by me in earlier cases was wrong or that I misunderstood it, I propose to adhere to the lines I have laid down.

Formaldehyde not an Analytical Reagent

It is said by the Board of Trade that the inclusion in the list of formaldehyde is justified (1) because it is an analytical reagent; (2) because it is a synthetic organic chemical; and (3) because it is a fine chemical.

(1) It is very difficult to say when a chemical which has a use as an analytical reagent is within the Act; but of this I have no doubt—that unless a chemical compound has a real and substantial use as distinct from a nominal or occasional use as an analytical reagent, it ought not to be included as such in the list. I am satisfied that the use of formaldehyde as an analytical reagent is too trifling to justify its inclusion in the list as an analytical reagent.

The Term "Synthetic"

(2) I think that a good deal of confusion may arise unless one bears in mind that neither chemists nor books speak of synthetic chemicals. The expressions "synthetic perfumes" and "synthetic dyestuff intermediates" are doubtless in common use, but I think that the word "synthetic" is used quite loosely in the former case, and I am told by Sir Arthur Colefax and Mr. Parry that the expression "synthetic intermediates" has a special meaning referring to bodies from which synthetic dyestuffs can be obtained. The use of the word in this connection, therefore, throws but little light upon its meaning in the Act.

Various writers have defined the word "synthesis." The word describes certain methods of production of chemical compounds. I am asked by the opponents to say that if a chemical can be produced synthetically that chemical is a synthetic chemical without regard to the question whether to any particular case the substance has been in fact so produced. In my opinion that is not the meaning of the Act. I think that the expression "Synthetic organic chemical" means such chemicals as have in fact been produced synthetically. The results of the contrary view, if logically worked out, are so startling that I shrink from its adoption.

In my opinion the question to be determined in each particular case resolves itself into this. Has the substance on the importation of which it is claimed that duty is payable in fact been produced synthetically? It is, of course, common ground that the synthesis of an organic chemical includes its building up (to use Thorpe's expression) or its formation (to use Richter's expression) from its elements. It is equally clear that synthesis includes the "building up" or "the formation" from such carbon derivatives as can be obtained from the elements. But if the carbon derivative actually employed in the latter case as the raw material is one which, although it could be, has not in fact been, produced synthetically, it is contended—at least I understand that it is contended—that the resulting compound is synthetically produced without regard to the nature or character of the further building up or formation from that raw material.

I am assisted in the decision of this point by the fact that there is no evidence to support the contention. Dr. Ormandy and Mr. Parry are at one on the point. To quote the former, "the raw material must be one which could in case of necessity be produced through all the steps from its elements and the further step must itself be synthetic." I accept that view.

There then remains to be decided the question whether the step taken, namely, the oxidation of methyl alcohol in the presence of a catalyst is truly described as synthesis. By this oxidation the methyl alcohol loses two atoms of hydrogen. Does this step partake of the nature of synthesis?

The Essence of Synthesis

In two earlier cases great stress has been laid upon the contention that the essence of synthesis was a building up or at any rate a bringing or placing together. The truth of that contention was one of the main issues in the camphor case. I quote the following passage from the opening remarks of Sir Arthur Colefax: "The Board of Trade are actually driven to this incredible position. Synthesis I have always until now understood merely as a matter of definition involved adding something to or putting something together. But they are driven by the logic of their argument to this truly remarkable position, that synthesis is no longer to be putting two things together but it is to be actually applied to a case where you take something away. It is a most remarkable use of the word synthesis and certainly I should have thought nobody has ever held it." And later he put to his main witness the question: "Mere oxidation

would never be talked of as building up." He also asked the question in argument, "Where is the case that they can point to in which you can find general acceptance of the term synthesis where the change does not involve an addition of a carbon atom ?" I quote these passages to show how clearly the contention was raised on the one side in that case.

On the other side the Board of Trade submitted that the meaning of a synthetic organic chemical was a chemical produced by controlled processes resulting in molecular changes of any kind. Dr. Forster, called for the Board of Trade, objected to the expression "building up" and argued that the true meaning was "placing together." He agreed that the generally understood meaning of synthesis was the bringing together of the component elements. He agreed that by the vast number of chemists to-day the bringing together of elements or radicles to form a more complicated body was their understanding of the term. On the evidence given in that case and on the arguments of Sir Arthur Colefax I accepted the view that synthesis, as generally understood, involved the bringing together of elements or radicles to form a more complicated body. I definitely rejected the contention that synthesis as generally understood included any molecular change so long as it was produced by controlled processes. I thought, and still think, that it is my duty to give to the words their commonly accepted meaning. Doubtless many chemists hold a different view. It is obvious that I cannot decide that the steps necessary for the formation of formaldehyde from methyl alcohol are synthetic without ignoring or reversing the view I took in the camphor case.

It is to be noticed that no evidence was called by the Board of Trade or those supporting their view as to the meaning of synthetic or as to whether formaldehyde was or was not a synthetic chemical. Dr. Ormandy dealt with it in cross-examination only. He did not take quite the same view as Dr. Forster. He expressed the opinion that an operation was synthetic if it was a controlled reaction, and if it gave proper yields, an entirely new suggestion. It is sufficient to say that no evidence has been given which satisfies me that the view I took in the camphor case was wrong. Incidentally that view is entirely consistent with the evidence given in the calcium carbide case.

Formaldehyde not a Fine Chemical

(3) I frankly admit that I should like to be able to decide that formaldehyde is a fine chemical. My difficulty is that I cannot find any ground upon which I can do so consistently with that I believe to be the true principles applicable. It is quite clear on the evidence that this substance has not been commonly regarded as a fine chemical.

The Chemist and Druggist definitely treated it as "heavy"; it appeared as heavy in Haywith and Hart advertisements. Several lists were put in in which formaldehyde was classified as technical or general as opposed to fine. This may not amount to very much; but, on the other hand, not a single instance could be given of formaldehyde being called a fine chemical or being classified as such a before the Act of Parliament. An American paper of 1923 was produced in which it was classified as "fine," and the list of British fine chemicals published in 1922 includes it. Dr. Ormandy was not asked about it. Mr. Allen, called by the opponents, could only say that he did not regard it as a heavy chemical, and that he did not understand the meaning of "fine." No one was called from any of the big fine chemical manufacturers. Two or three gentlemen were called who expressed the opinion that it was a fine chemical, but there was not any evidence at all that when this Act was passed formaldehyde had been regarded as a fine chemical in any branch of the trade.

According to my decision in the tartaric acid case this finding ought to settle the case; but I think that one is driven to the same conclusion by a consideration of the other circumstances said to be relevant. This chemical is not a pharmaceutical chemical. The opponents disclaimed any intention of putting it forward as such. It is an industrial chemical produced on a fairly large scale—a scale very large for a fine chemical.

Industrial versus Fine Chemicals

There is no doubt that most of the witnesses that have given evidence before me regard an industrial chemical used on a substantial scale as something very different from a fine chemical. Even representatives of Messrs. May and Baker and Messrs. Howard, manufacturers of fine chemicals on a very large scale, take the same view. A special plant is necessary for its production. It is handled in quantities somewhat big for a fine chemical.

On the other hand, it is said that the formaldehyde on the market is of great purity and that its manufacture involves continuous scientific control. One has only to re-read the evidence in the earlier cases to see (1) that the degree of purity does not help very much, and (2) that the scientific control there described as necessary to stamp the product as a fine chemical was a control of highly trained chemists as opposed to the skilled control of persons trained *ad hoc*, with the result that the cost of that control was high relatively to the total cost.

I am not at all satisfied that the skill required to produce formaldehyde is anything more than the skill of men taught and trained for the particular purpose, and Mr. Romanes said, in his evidence, that if you worked out the cost per ton of the scientific supervision you would find it very small. I do not think that the description of the fine chemical group (Group 6 of the British Chemical Manufacturers) covers this substance.

The case is one of those border line cases upon which opinions will necessarily differ, but, dealing with it as best I can on the evidence given, I find that the complainants have made out their case and that I must award that formaldehyde be excluded from the list.

Award on Rochelle Salt

Ordered to Remain in the List

THE Official Referee has also given his award on the Rochelle Salt complaint, which is dismissed. His decision is in the following terms:—

"In my opinion no case has been made out for taking Rochelle Salt out of the list. The Rochelle Salt of commerce is a pharmaceutical chemical. It has also a well recognised use as an analytical reagent. It has practically no industrial use. I am inclined to think that the use as an analytical reagent in itself justifies the inclusion of Rochelle Salt in the list, but I do not decide the case on that ground. Mr. Kenneth Swan's contentions may possibly require very careful consideration in some future case. I decide this case on the ground that there is no evidence to justify me in saying that the Board of Trade was wrong in including Rochelle Salt in the list as a fine chemical. The fact that the chemical is used only in pharmacy and as a reagent raises a strong presumption that the trade would regard it as a fine chemical. Mr. Howard said that it was known in the trade as a fine chemical. Mr. Blenkinsop and others gave similar evidence. There was no trade evidence to the contrary. In my opinion there is no evidence that Rochelle Salt is wrongly included in the list, and I award that the complaint fails."

Affairs of Gerald Bromage and Co., Ltd.

A MEETING of the creditors of Gerald Bromage and Co., Ltd., dealers in essential oils, etc., 9, Foster Lane, London, E.C. (in voluntary liquidation), was held on August 17. Mr. J. J. Middleton, official liquidator, presided.

An approximate statement of affairs showed liabilities £2,680, of which £2,669 was due to unsecured creditors, almost entirely for goods supplied. Assets were estimated to realise £804, leaving a deficiency of £1,876. The company was formed in 1921 with a nominal capital of £5,000 in £1 shares, to take over the business of Mr. Bromage in Lower Thames Street. During the first year the turnover was £22,150, with a gross profit of £1,580 (equal to 7½ per cent.), but after allowing for disbursements there was a net loss of £1,126.

In reply to questions, the Chairman said the reason the company did not go into liquidation at the end of June, 1922, was that the directors hoped that trade would revive. The principal creditors were the Chemische Fabrik Naarden, for whom the company had acted as agents. The money received for their goods sold went into the business. The failure had almost entirely been brought about by the slump in trade; there was no question of reconstruction or of any offer being made.

The creditors resolved on voluntary liquidation, with Mr. Middleton as liquidator and an advisory committee of three creditors.

German Trade and Industry

THE Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade a review, based on the reports of the Prussian Chamber of Commerce, of trade and industry during July, from which the following extracts are taken :—

The consequences of the occupation of the Ruhr continued to take effect during July. A further substantial depreciation of the mark was caused. Although this gave another fillip to some branches of trade and industry, it was in many cases due to the anticipation of still greater increases in prices. In general, however, industry was unfavourably affected and its productive capacity impaired. The special feature of the month was the great advance in wages and salaries and in the prices of all commodities as a result of the currency depreciation, which called forth considerable unrest in all classes of the population. The Occupied Territory suffered particularly from the effects of the occupation. The stocks of coal and coke there are nearing exhaustion.

Potash

In the potash industry sale prices as well as wages and salaries and the costs of raw materials rose rapidly. The enormous increase in the price of potash products, together with the advance in freights, caused agricultural orders gradually to fall off. The fuel supply presented great difficulties ; in many cases a fairly large shortage of trucks was noticeable. Foreign trade, where the competition of Alsatian works had to be taken into account, was brisk, particularly in sulphate of potash products for America. All by-products found a good market, and were in strong demand.

Petroleum

In the petroleum industry, prices for petroleum were determined by imports and the rates of foreign exchanges, as Germany herself only produces a small quantity of this product. Consequently only such works are capable of surviving in Germany as can produce comparatively large quantities in proportion to the labour required. Those works in Lower Saxony which were mostly favourably situated in this respect reported continued good employment. More hands were taken on in order to increase production.

Metals

The greatest uncertainty prevailed on the German metal market, particularly Berlin, as a result of the conditions on the foreign exchange market. Obtaining cover in foreign currency to meet obligations became increasingly difficult. The greater difference between German and the world's market quotations lead at times to the discontinuance of quotations on the Berlin and Hamburg Metal Exchanges. The metal market was, therefore, exceptionally quiet throughout the whole month, particularly as there was, in addition, a metal workers' strike from the 4th-13th July.

Aluminium

In the aluminium industry in Ludenscheid and neighbourhood employment was normal. Inland sales declined. Prices were unable to keep pace with the fall of the mark, and losses were consequently sustained.

Electro-Technical Industry

In the electro-technical industry the supply of brown coal and brown coal briquettes was, in part, inadequate, and the procuring of raw material and semi-manufactures from abroad was greatly interfered with owing to the difficulty of securing foreign currency.

Stones and Earths

Business in the stones and earths industry continued bad. Undertakings endeavoured with all the means at their disposal to keep their works running. At Coblenz, the danger of having to close down is approaching nearer owing to the inadequate supply of raw materials, particularly of coal in the case of the fireproof products industry, and of lime and cement in the case of the pumice-stone industry. There were exceedingly few sales.

Glass

The demand for sheet-glass was, in general, strong, and employment in the sheet-glass works was good. The Upper Lausitz works had, in part, to deliver also to the sale areas of the Rhenish and Westphalian sheet-glass works whose sales were interfered with by the political position. Inland and foreign sales were satisfactory. The foreign demand increased to a not inconsiderable extent. In the Gorlitz hollow-glass industry complaint was made as to inadequate supplies of soda and coal. There was an exceptional rise in the prices of raw materials and in wages, necessitating substantial increases in the prices of manufactures. Inland and foreign orders came in on a restricted scale, although July is regarded as the main season for the hollow-glass industry. It was observed that foreign customers were slower in paying than formerly.

Transport

German shipping companies, in so far as they concluded business in foreign currency, suffered less than other countries from the effects of the economic conditions in Europe, although, in view of the last substantial increases in wages, prices of bunker coal, all running costs, rates for chartering, etc., profits were extremely meagre. Shipping companies employed in the German coastal traffic, who obtained their receipts in marks, were in an exceptionally unfavourable position.

British Cast Iron Research Association

WE are officially informed that the general research work is progressing to such a degree that the director proposes issuing forthwith reports on the various results. The Bureau, in their Bulletin, have begun the publication of a series of articles on foundry sands, which will include some valuable data. The object of this research is to establish standards to enable members to judge one of the most important factors in the successful production of castings.

During the last month members have sent in problems on the following subjects : Locomotive injectors, air-compressing engine cylinder liners, annealing malleable iron, porosity in castings, pan-mill roller rings, mottled castings, spongy trunk slides, cupro-nickel ingot moulds, fluted cast iron roll moulds, chilled iron rolls, faulty covers in castings, and cupola design.

Among new members are several large firms who recognise the value of the work of the association. The membership badge is very generally used on stationery, and this custom has been found valuable in many respects. Mr. F. Fielding, of Fielding and Platt, Ltd., Gloucester, has been elected to represent Gloucester, Hereford and Monmouth on the General Council.

Ironfounding employers' associations and other sections are invited to arrange meetings at which the Director of Research and the Secretary could attend to discuss the needs of the industry. Everything is being done in America to increase the production of malleable castings and to obtain their adoption for every possible engineering use, and the Council consider that this effort abroad should stimulate malleable ironfounders in this country to join the association in order to obtain a general improvement in castings and provide data which could be placed before railway and automobile engineers as to the superiority of malleable work

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A Survey of Radio-Activity

RADIO-ACTIVE substances are continually ejecting particles at very high velocities ; and it has been established that, in all cases, the particle thus expelled is the nucleus of a helium atom of mass 4 carrying two positive charges of electricity. This flying atomic nucleus is not only the most energetic projectile known, but also an agent of great power in probing the structure of atoms. Sir Ernest Rutherford, F.R.S., Cavendish Professor of Physics in the University of Cambridge, and the leading authority upon the properties of radio-active bodies, has given particular attention to the changes undergone when the swift particles from them pass through matter, and surveys the field of these encounters in an address entitled "The Life-History of an Alpha-Particle," published as a special supplement to *Nature* of August 25.

New Italian Customs Tariff

THE Italian customs tariff was modified by a Decree Law of July 11, and the following items dealing with chemicals, etc., are quoted from the special supplement published with the *Board of Trade Journal* of August 16. In many cases the duty has been reduced, as will be seen by referring to the entry under the heading "Co-efficient of Increase"

Inorganic Chemical Products.

	Kilogs.	Import Duty (Gold Lire).	Co-efficient of Increase.
Bromine	100	2 00	—
Phosphorus, white and red, and sulphides of phosphorus	100	50 00	0·5
Acids:			
Hydrochloric		Free	—
Sulphuric		Free	—
Oxides of aluminium:			
Anhydrous	100	10 00	1
Hydrated (including gelatinous alumina)	100	5 00	1
Oxide of thorium and cerium		4 00	—
Oxide of zinc	100	8 00	1
Carbonate of soda (Crystallised)	100	2 00	0·2
Chloride of barium	100	5 00	1
Lithopone	100	10 00	0·6
Hydrosulphites, not specified elsewhere, and their derivatives	100	20 00	0·5
Silicates of potash and of soda:			
Solid or in solution containing less than 50 per cent. of water	100	2 50	1
Liquid or in solution containing at least 50 per cent. of water	100	1 00	1
Salts of thorium and of cerium		2 00	—
Oxygenated water:			
Volume of oxygen per	100	0 40	0·5

Fertilisers.

	Kilogs.	Import Duty (Gold Lire).	Co-efficient of Increase.
Chemical fertilisers, nitrogenous:			
Calcium cyanamide	100	3 00	—
Nitrate of ammonia, impure, for agriculture	100	1 00	—
Potassic chemical fertilisers		Free	—

Organic Chemical Products.

	Kilogs.	Import Duty (Gold Lire).	Co-efficient of Increase.
Glycerin, Crude	100	5 00	—
Glycerin, Refined	100	8 00	1
Tartrates, not specially mentioned	100	10 00	0·6
Formaldehyde:			
In solution up to 40 per cent.	100	15 00	0·2
Other	100	30 00	0·2
Aniline derivatives, not specially mentioned	100	20 00	0·2
Naphthalene derivatives, not specially mentioned	100	200 00	0·2
Benzidine	100	200 00	0·2
Tolidine, dianisidine, ortho- and para-toluidine	100	200 00	0·2
Xylidine	100	200 00	0·2
Phenylenediamine, phenetidine, anisidine	100	200 00	0·2
Derivatives of benzidine, toluidine, tolidine, dianisidine, xylidine, phenylenediamine, phenetidine, and anisidine, not specially mentioned	100	200 00	0·2
Resorcin	100	200 00	0·2
Naphthol (alpha and beta)	100	200 00	0·2
Derivatives of naphthol and of naphthylamine, not specially mentioned	100	200 00	0·2
Derivatives of phenic acid, not specially mentioned	100	200 00	0·2
Benzaldehyde and derivatives	100	200 00	0·2
Derivatives of benzol, toluol, and xylol, not specially mentioned	100	200 00	0·2
Quinine and other bases from Peruvian bark and salts thereof:			
Quinine and other bases from Peruvian bark and sulphate of quinine	—	Free	—
Other salts of quinine	—	10 00	—

Dyeing and Tanning Materials, Colours and Varnishes.

	Kilogs.	Import Duty (Gold Lire).	Co-efficient of Increase.
Organic Synthetic colours:			
Sulphur colours:			
1. Black	100	80 00	0·2
2. Other	100	100 00	0·4

Low-Temperature Carbonisation

A REPORT has just been published by the Fuel Research Board on preliminary experiments in the low-temperature carbonisation of coal in vertical retorts (Technical Paper No. 7, H.M. Stationery Office, 9d. net). The investigation described in the present report presents no new installation, but gives the results of working the vertical retorts at furnace temperatures intended to carbonise the coal at something like the temperature used in the previous low-temperature experiments—that is, about 700° C. This arrangement involved an obvious loss of thermal economy and other disadvantages, which made it evident that, as the report states explicitly, the results could not profess to represent a solution of the problem of economical low-temperature carbonisation of coal. The coal used in these experiments was for the most part a mixture of 60 per cent. fusible with 40 per cent. non-caking, of the same varieties as had been used with the horizontal retorts in earlier experiments.

The temperatures within the retort were explored at various heights with an insulated iron-constantan couple, and it was found that with no steaming the temperature in the centre of the retort rose very slowly as the coal descended. With steaming, on the other hand, the temperature rose more rapidly, the acceleration beginning about 10 ft. down; the maximum temperature was about 100° C. less than with no steam, but was attained fully 2 ft. higher in the retort. The trials were made with no steam and with steam to about 7¼, 13¾, and 20 per cent. of the weight of coal carbonised. The chief respect in which the products, of which full details are given in the report, seem to have varied from those obtained with ordinary low-temperature carbonisation was that the yield of sulphate of ammonia was exceptionally high and apparently was increased by increased steaming. With steel or iron retorts properly designed for the work the conditions should be more favourable to good working. It would seem, therefore, adds the report, that a setting of similar construction, with iron retorts, would be a possible method of manufacturing a good smokeless fuel by the carbonisation of coal at low temperatures.

Reduction of Iron Oxides

THE factors that determine the efficiency of reduction of iron oxides by gaseous reducing agents may be considered in two classes—those which affect the equilibrium between the reacting substances and their products and those which affect the rate of reaction, states Mr. E. D. Eastman, associate physical chemist of the Department of the Interior, in Serial 2485, just issued by the U.S.A. Bureau of Mines. Both sets are of practical importance, the former as influencing the maximum possible efficiency and the latter as determining what fraction of the maximum yield may be readily or profitably obtained. In addition, the thermal changes attending the reduction greatly affect the chance of successful industrial application of any such process, and knowledge of them is necessary for the intelligent design of apparatus and control of the reaction. Some aspects of each of these three divisions of the problem are discussed in Serial 2485, the gases specially considered being coal gas, water gas, and producer gas. Serial 2485 may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C.

Lime Developments in America

THE National Lime Association of the U.S.A. is preparing to enlarge its research programme. This will be divided into two sections (1) national technical research and publicity; (2) local trade promotion work. A larger sum of money than previously allowed has been voted by the members of the Association for this development. A number of changes have been made in the staff of the Association. Mr. Charles Warner, who served as President of the Association for the last four years, has been succeeded by Mr. George B. Wood, President and General Manager of the Rockland and Rockort Lime Corporation, of Rockland, Maine. Dr. M. E. Holmes has also resigned from the technical staff of the Association, and Dr. G. J. Fink has been appointed chemical director in his place.

From Week to Week

THE DEATH is announced of Mr. Ben Clarke, head of Ben Clarke and Sons, wholesale chemists and instrument dealers, Belfast, in his 78th year.

DR. PERCY LONGMUIR, the director of research to the British Cast Iron Research Association, has been obliged to resign his post owing to ill-health.

WILLIAM FULTON AND SONS, LTD., scourers, dyers and finishers, Glenfield, Paisley, have acquired the business of James M'Lardie and Sons, Ltd., dyers, bleachers, scourers and finishers, Meikelriggs, Paisley.

THE TECHNICAL PAPERS arranged for the winter session of the West Yorkshire Metallurgical Society include one by Mr. H. S. Houldsworth, M.Sc., on "Some Physical and Chemical Properties of Refractory Materials."

A STUDY of potash deposits in Russia has been made by Professor Brianishnikoff, agricultural chemist, who estimates potash reserves in European Russia alone at 5,568,000,000 tons. The largest deposits are located in the provinces of Viatka and Kama.

THE PERFECTION of a low-temperature carbonisation process discovered by Professor S. Roy Illingworth of the South Wales School of Mines, Treforest, is announced. The special feature claimed for the process is the production of a smokeless fuel equivalent to best Welsh coal.

DR. F. W. ASTON's lecture before the Smithsonian Institution in Washington, U.S.A., in 1921, has been reprinted as a separate pamphlet by the Government printing office at Washington. A feature of the booklet is the reproduction of Dr. Aston's comparative diagrams to illustrate the size of atoms, etc.

MR. PAUL WOOTON, the Washington correspondent of *Chemical and Metallurgical Engineering* and other journals of the McGraw-Hill Co. of New York, is at present in England investigating scientific and industrial conditions in several of our leading industries. He will remain here until early in September.

THE INSTITUTION OF THE RUBBER INDUSTRY will hold the first meeting of the session on Monday, September 17, at the Kelvin Room of the Engineers' Club, Coventry Street, London, when Mr. Evan J. Edwards, of the North British Rubber Co., Ltd., will read a paper on "Rubber Floors and Rubber Roadways."

DR. G. D. LIVEING, ninety-five years of age, a former professor of chemistry, gave an address last week at the Federation of Workers Conference at St. John's College, Cambridge, of which he was at one time president. Sixty years ago Dr. Liveing started a laboratory in Cambridge, and he has kept term ever since.

THE EXPECTED SHORTAGE of calcium arsenate in America has not been realised, largely owing to the weather in the southern States having been unfavourable to the boll-weevil. As a result dealers who laid in large stocks in the spring have found themselves faced with a heavy loss, the price of the arsenate having fallen from 17 cents (nominally 8½d.) per lb. to 12 cents or even lower.

AT A MEETING of chemists in the paint and varnish industry in the United States recently the formation of a Paint and Varnish Section of the American Chemical Society was discussed. It is likely that the officers of the Society will be petitioned to permit the organisation of such a section, and if sufficient support is given it is hoped to have this in operation by September.

"ALUMINIUM FACTS AND FIGURES," is the title of a pocket size booklet (about 3 in. by 4 in. by ⅛ in.) issued by the British Aluminium Co., Ltd., 109, Queen Victoria Street, London, E.C. The facts and figures dealt with relate to the weights of aluminium sheet, circles, wire, etc., of different sizes, the specific resistance of aluminium wire, and other matters of value to users of this metal.

FROM AUGUST 3 to August 18 about 74,000 tons of nitrate arrived in London, and 35,000 tons were due within the next fortnight. International politics have had the effect of keeping the tone of the market quiet and easier. Some sales have been as low as £11 6s. 3d. per ton, but generally quotations were from £11 7s. 6d. to £11 10s. August-September, and £12 to £12 2s. 6d. per ton c.i.f. for season shipment.

A NEW OILSEED CRUSHING MILL has been erected at Greenock alongside the James Watt Dock, at an initial expenditure of £130,000. It has a crushing capacity of 500 tons of seed per week, and the plant is so arranged that this capacity can be doubled at very short notice. Facilities are provided for the discharge from steamers of bulk and bag cargoes, and there is storage capacity for 10,000 tons of linseed. The materials handled will be mainly cottonseed and linseed.

THE BRITISH PHOTOGRAPHIC RESEARCH ASSOCIATION which was the first Research Association to be formed under the Department of Scientific and Industrial Research, completed its term of five years in May last. A number of papers dealing with fundamental principles have been authorised for publication in the various scientific journals. In view of the work accomplished the Department of Scientific and Industrial Research has promised a grant for a further period.

CONTINUED EXPANSION of the oil-refining industry in Great Britain, and of the demand for home-produced petrol, are indicated in the latest Customs House figures giving the weekly imports of crude oil into the British Isles. The figures show an increase of nearly 2,000,000 gallons over the previous high record of deliveries to the Anglo-Persian Oil Co.'s plant near Swansea. In the period covered seven full cargoes of crude oil, totalling 17,035,525 gallons, arrived from Persia to be refined.

A QUANTITY OF NAPHTHALENE caught fire on Sunday at the Hanley by-product plant of the Shelton Iron, Steel and Coal Co., Ltd., and a disastrous explosion was narrowly averted. Soon after the naphthalene was alight, one of four adjoining tanks of tar caught fire. Close by were a benzol store, a naphthalene tank, three tanks of tar, and an extensive power house which supplies power to the company's collieries and works. Firemen and workmen, by pouring sand on the flames, succeeded after three hours' work in overcoming the danger.

THE LESSON to be learned from the Safety in Mines Research Board's demonstration explosions at the Eskmeals experimental station near Millom on Sunday, according to Professor R. V. Wheeler, of Sheffield University, is that although the Government regulations require stone dust to be mixed to the extent of 50 per cent. with coal dust in mines, that mixture does not necessarily ensure immunity from explosions. Among the experiments was one in which fuller's earth and coal dust were mixed in equal proportions. Although the force of the explosion was lessened in this case, the mixture fired readily.

THE DEATH is announced of Mr. Richard T. Statham, partner and director in the firm of John Statham and Sons, manufacturers of acid-resisting stoneware, Windsor Bridge, Manchester. In announcing the death, which resulted from a motor accident, Mr. W. Statham, the surviving partner, states that he is glad to know that the memory of his "cousin and partner" will always be held in kindly regard by all with whom he came in touch in his many personal activities as well as in the conduct of the business. "For myself," he adds, "this inexpressible loss means the break of a happy partnership and comradeship of over thirty years."

PROSPECTIVE EXHIBITORS at the Shipping, Engineering, and Machinery Exhibition, to be held at Olympia from August 31 to September 22, include in addition to those already mentioned, the Foster Instrument Co., who will show industrial pyrometers for use by engineers, and the Foster Strainmeter for measuring launching strains; and Walker, Crosweller and Co., Ltd., who will have on view their Arkon indicating and recording instruments for boiler house and works control, gas analysis recorders, gas volume indicators, and recorders of the hydrostatic or liquid-filled type, draught and pressure gauges, water column gauges, and thermometers for all industrial purposes.

RESEARCH FELLOWSHIPS for the year 1923-24 have been granted by the British Research Association for the Woollen and Worsted Industries to Mr. Robert Burgess, B.Sc., of Nottingham, to carry out investigations on the damage and deterioration caused by bacteria and fungi on woollen goods and yarns during storage; and Mr. H. E. Farrar, B.Sc., of Leeds, to conduct research on the dyeing of wool with acid and mordant colours. Advanced scholarships have been granted to Mr. S. Menzer, tenable at the University of Leeds; Mr. T. N. T. Graham, tenable at the Scottish Woollen Technical College, Galashiels; Mr. P. M. Redman, of Keighley, and Mr. W. Lee, of Halifax, tenable at the Bradford Technical College.

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METHANE.—The reduction of carbon monoxide to methane over an iron contact under pressure. F. Fischer and H. Tropsch. *Brennstoff-Chem.*, July 1, 1923, pp. 193–197.

COAL.—The chemical structure of coal. W. Schrauth. *Brennstoff-Chem.*, June 1, 1923, pp. 161–164.

WOOD DISTILLATION.—Wood distillation in vacuum. O. Aschan. *Brenstoff-Chem.*; Part II, May 1, 1923, pp. 129–132; Part III, May 15, 1923, pp. 145–147; Part IV, June 1, 1923, pp. 164–167.

ETHYLENE.—The use of chlorsulphonic acid for the absorption of ethylene from gas mixtures. W. Traube and R. Justh. *Brennstoff-Chem.*, May 15, 1923, pp. 150–154.

The estimation of ethylene and its homologues in gas. H. Tropsch and A. v. Philippovich. *Brennstoff-Chem.*, May 15, 1923, pp. 147–149.

DISINFECTANTS.—Testing and evaluation of disinfectants. E. Hailer. *Z. angew. Chem.*, August 15, 1923, pp. 423–427.

COLLOIDS.—Metal sols in non-dissociating dispersion media. Part I. Nickel in benzene and toluene. E. Hatschek and P. C. L. Thorne. *Kolloid-Z.*, July, 1923, pp. 1–8.

Colloid chemistry and the glue industry. Part II. The evaluation of glue. E. Sauer. *Kolloid-Z.*, July, 1923, pp. 40–53.

Patent Literature

Abstracts of Complete Specifications

200,848. Titanium Compounds, Preparation of. W. B. Llewellyn, H. Spence, and Peter Spence and Sons, Ltd. Manchester Alum Works, Holland Street, Manchester. Application date, January 17, 1922.

In treating some titanium minerals, especially those containing only a small proportion of titanium oxide, with hot sulphuric acid, it is found that titanium sulphate is not readily formed. In the present invention such titanium minerals are treated in granular condition with sufficient sulphuric acid to give a semi-dry homogeneous mixture. As an example, 100 parts of a mineral containing 10 per cent. of titanium oxide requires about 50 parts of sulphuric acid of specific gravity 1·40, together with any additional quantity necessary to combine with other bases in the mineral. The mixture is then gradually heated to 300° C. in a muffle furnace for 12–24 hours. A high yield of the titanium content is obtained in the form of water-soluble sulphate, which may in some cases be in a basic condition. If an acid sulphate is required the strength of the sulphuric acid employed must be increased.

200,851. Anthraquinone Sulphonic Acids, Method of Producing. J. Thomas, and Scottish Dyes, Ltd., Murrell Hill Works, Carlisle. Application date, January 18, 1922.

The process is for producing anthraquinone sulphonic acids, particularly in connection with the sulphonation of anthraquinone in the presence of mercury. It has been found that in this sulphonation, either for the production of anthraquinone alpha-monosulphonic acid, or for the alpha-alpha-disulphonic acids, a considerable proportion of alpha-beta-disulphonic acids is produced. The rate at which alpha-sulphonic groups are eliminated from anthraquinone sulphonic acids by treatment with sulphuric acid and mercury is much more rapid than the rate at which beta-sulphonic groups are eliminated. Alpha-beta-disulphonic acids of anthraquinone or their salts are therefore treated by hydrolysis with sulphuric acid of 80 per cent. strength in the presence of mercury at 180°–200° C., for the production of anthraquinone or anthraquinone beta-monosulphonic acid. In carrying out the process, anthraquinone is sulphonated with oleum in the presence of mercurous sulphate, and the anthraquinone mono-alpha-sulphonic acid is separated from the unchanged anthraquinone by pouring into water. The mono-sulphonic acid is separated from the filtrates as the potassium salt, and the disulphonic acids are then isolated by evaporation or precipitation with salt. The disulphonic acids are then hydrolysed with sulphuric acid in the presence of mercury as described above, which yields a mixture of anthraquinone and anthraquinone-beta mono-sulphonic acid.

200,852. Treating Ores and Concentrates to Convert Them into Sulphates, Process for. J. B. Read and M. F. Coolbaugh, 1,429, 18th Street, Denver, Col., U.S.A. Application date, January 18, 1922.

The process is for treating complex sulphides of lead and zinc, and also oxidised minerals, by a one-step process to convert them into sulphates. The ore or concentrate is passed through the furnace in the same direction as the air for roasting, so that the greater portion of the desulphidising action takes place nearer the feed end of the furnace, and the sulphating action nearer the discharge end of the furnace. The temperature in the sulphating zone is reduced by radiation, or by introducing cold gas. Sulphur dioxide is converted into sulphur trioxide by the catalytic effect of ferric oxide, and a basic ferric sulphate insoluble in water is formed from the excess sulphur and iron at temperatures between 425°–650° C. This basic sulphate, although insoluble in water, has a positive solvent action in the presence of water on sulphides which have escaped desulphidisation, and on oxides which have escaped sulphating. In the application to a complex lead and zinc sulphide, the mineral or concentrate is passed through the furnace in the same direction as the air current, fuel being also added if the sulphur in the ore is insufficient to give the necessary heat. Gases containing sulphur may also be added if necessary. A desulphidising temperature of 600°-1000° C. is maintained, and the sulphides of lead, zinc, iron and copper are converted into oxides. The sulphur liberated as sulphur dioxide is converted into sulphur trioxide by the ferric oxide, and this acts as an oxidising agent. The furnace temperature is reduced towards the discharge end, the temperature necessary to separate the lead and zinc being 380°–850° C. The lead is discharged as sulphate or basic sulphate, and the zinc, copper and silver as sulphates. This product is treated with water to separate the zinc, copper and silver from the lead sulphate, ferric oxide, metallic gold, etc. The basic ferric sulphate ensures the conversion of practically 100 per cent. of all convertible oxides and sulphides to sulphates, so that it is possible to obtain nearly complete separation of metals whose sulphates are soluble from those whose sulphates are insoluble. Natural oxides, carbonates, etc., may be mixed with sulphides and treated in a similar manner. Ferric oxide and sulphur dioxide may be added from an independent source if necessary.

200,873. Acetyl Silk and Union or Mixed Fabrics containing it, Methods of Dyeing. A. G. Green and K. H. Saunders, Crumpsall Vale Chemical Works, Blackley, Manchester, and British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London. Application dates, March 18, August 30 and November 16, 1922.

When the methyl-omega-sulphonic acids derived from amido-azo compounds are treated in hot aqueous solution, preferably slightly acid or slightly alkaline, they slowly dissociate with liberation of free amido-azo bases. If this is carried out in a dye bath containing acetyl silk the slightly soluble amido-azo compound is taken up by the fibres, which are thus dyed. The compounds thus fixed on the fibre may be diazotised with nitrous acid, and then developed with various phenols, amines, and amidophenols, giving a range of colours from yellow to red and black. The methyl-omega-sulphonic acids employed are azo compounds containing the group $NH.CH_2.SO_3H$ once or twice. No sulphonic group must be directly attached to the benzene or naphthalene nucleus of the amido-azo residue. The methyl-omega-sulphonic acids derived from mono-alkyl-amido-azo bases may also be used for the dyeing of acetyl silk. The secondary dyestuffs, which in addition to the methyl-omega-sulphonic radicle attached to the alkyl-amido group, also contain a primary amido group or a second methyl-omega-sulphonic radicle attached to a primary amido group, are also capable of being employed as described for the primary dyestuffs. These dyestuffs may be employed, in combination with other dyestuffs having selective affinity for cotton, wool, linen, or other varieties of artificial silk, to obtain differential colouring on mixed fabrics. A number of examples are given.

200,902. Cyanides, Process of Manufacture. E. C. R. Marks, London. From E. I. Du Pont de Nemours and Co., Wilmington, Del., U.S.A. Application date, April 19, 1922.

An alkali metal cyanide is produced by heating in contact with nitrogen a mixture containing an alkali metal compound such as sodium carbonate, a catalyst such as iron or iron oxide, and carbon which has been obtained by incinerating alkali-soluble constituents of crude cellulose. It has also been found that if an alkali metal halide such as sodium fluoride or chloride is added to the mixture, the formation of sodium cyanide takes place at lower temperatures. In an example, a mixture of sodium carbonate 40 per cent, iron oxide 15 per cent., sodium fluoride 5 per cent., and carbon 40 per cent. is heated in a retort to 925° to 950° C. A current of nitrogen is then passed through at a pressure of 20 lb. per square inch, until the effluent gas contains little carbon monoxide. If producer gas is used as the source of nitrogen, the end of the reaction is indicated by a decrease in the carbon monoxide content of the gas. The mixture is allowed to cool in the retort. The yield of cyanide is diminished when carbon derived from coal is used, due to the presence of silica, alumina sulphur, phosphorus, etc., and it is preferred to use carbon derived from wood pulp or other vegetable fibrous materials. To produce the carbon, the wood is digested with caustic soda, and the liquor drained off and evaporated to a density of 35°-40° Bé. This liquor is passed to an incinerator where it is dried and ignited. The ash is then leached to dissolve the

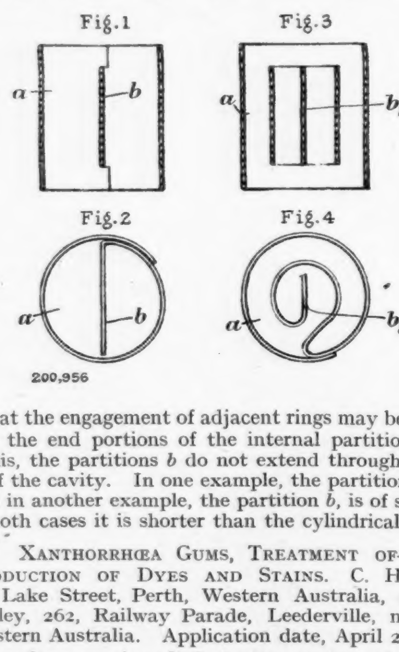
soda ash, and the remaining carbon washed with cold water, yielding a highly active absorptive carbon containing 2-4 per cent. of sodium carbonate. A higher yield of carbon may be obtained by calcining in a closed kiln. The yield of carbon is increased and its chemical activity is higher if the liquor is evaporated at comparatively low temperatures (200°-300° C.). The ignition temperature of this carbon is usually below 900 C., and it may contain 60-65 per cent. of soda ash. The mixture of carbon and soda ash may be used directly for the cyanide reaction without separation. In making up the charge, the cellulose liquor may be mixed with the necessary catalyser and alkali metal halide and evaporated to dryness. The yield of sodium cyanide obtained in the process is 95–98 per cent. When the reaction has proceeded about one-quarter of the full time necessary, the volume of the charge shrinks to one-half. An additional charge of about one-half the original is then added, and the reaction may be completed without substantially increasing the time necessary, and with an increase in yield of about 50 per cent.

200,933. Continuous Dehydration and Distillation of Tar or Oils, including Cracking of Residuals. T. O. Wilton, of Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Hendon, London, N.W. Application date, April 24, 1922. Addition to 127,700. (See The Chemical Age, Vol. I, p. 109.)

Specification 127,700 describes the continuous dehydration and distillation of tar by passing it through a series of coils at certain pressures and temperatures, and suddenly expanding it in chambers attached to each coil. The lighter constituents are thus successively volatised. In this invention the residue is cracked by raising the temperature of the second coil above 350° C., and the two coils are placed side by side. If mineral oil or horizontal retort tar is treated, the cracking temperature necessary is 360°—400° C., and the cracking may be effected in two steps. In this process the proportion of pitch obtained may be reduced to about 20 per cent.

200,956. Packing or Filling Material for Reaction Chambers, Towers, Absorption Chambers, and the Like. C. Shaefer, 103, Stahlmerstrasse, Dortmund, Germany. Application date, May 3, 1922.

This packing or filling is of the Raschig ring type—*i.e.*, short tubes having longitudinal internal partitions or webs, the tubes being disposed irregularly in the casing. It has been



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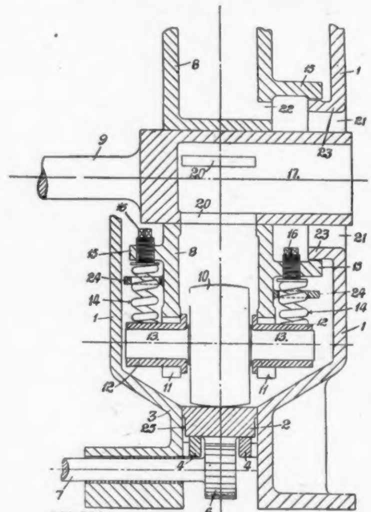
found that the engagement of adjacent rings may be interfered with by the end portions of the internal partitions, and to avoid this, the partitions *b* do not extend through the whole length of the cavity. In one example, the partition *b* may be flat, and in another example, the partition b_1 is of spiral form, but in both cases it is shorter than the cylindrical portion.

200,942. Xanthorrhœa Gums, Treatment of—for the Production of Dyes and Stains. C. H. Moulder, 45, Lake Street, Perth, Western Australia, and F. P. Gulley, 262, Railway Parade, Leederville, near Perth, Western Australia. Application date, April 28, 1922.

Xanthorrhœa gum is melted at a temperature of 180°—220° C., and 18·4 per cent. of sulphuric acid is slowly added while maintaining the temperature until the evolution of gas ceases. The viscous mixture is allowed to cool and is then crushed to a powder. About 70 per cent. of the product may be extracted with alcohol, and may then be distilled, leaving a solid residue which may be employed for stains or varnishes.

200,990. Grinding or Crushing Machines. T. A. Anthony, 49, Rosset Road, Great Crosby, Liverpool, and A. Ross, 19, South John Street, Liverpool. Application date, June 2, 1922.

The casing 1 is constructed in two parts which enclose between them the crushing or grinding ring 2. This ring is supported on flanges 4 and is slowly rotated by means of a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rotating pinion 6, which engages with teeth on the periphery of the ring. The grinding rollers 10 are carried in sleeve bearings 12, which are mounted in radial slots 11 in a carrier member 8. These rollers are pressed outwards by centrifugal force and by adjustable springs 14. The material to be ground is fed through the part 17 of a shaft 9, and thence through the openings 20. Air may be drawn into the machine through ports 21, 22 by means of a suction fan to keep the material in circulation. Vibration of the rollers in starting is avoided in this machine as the rollers are always pressed into contact with the ring.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 178,852 (L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude), relating to devices for bringing liquids and gases into intimate contact, see Vol. VI, p. 883; 179,951 (A. Heinemann), relating to manufacture of formic aldehyde, see Vol. VII, p. 58; 180,978 (Naugatuck Chemical Co.), relating to vulcanisation of rubber or similar materials, see Vol. VII, p. 174; 189,107 (Barrett Co.), relating to manufacture of aromatic aldehydes, see Vol. VIII, p. 103; 190,123 (Soc. Chimique des Usines du Rhône) relating to manufacture of the calcium salt of acetyl salicylic acid, see Vol. VIII, p. 153; 192,994 (Soc. Chimique des Usines du Rhône), relating to treatment of cellulose acetate before dyeing, see Vol. VIII, p. 433; 196,265 (Holzverkohlungs Industrie Akt. Ges.), relating to artificial resins, see Vol. VIII, p. 653.

International Specifications not yet Accepted

199,354. Disubstituted Guanidines as Vulcanising Compositions. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A.. (Assignees of H. S. Adams, 15, New Street, Naugatuck, Conn., U.S.A., and L. Meuser, 84, Cliff Street, Naugatuck, Conn., U.S.A.) International Convention date, June 19, 1922.

A symetrically disubstituted thiourea is treated with ammonia and a metal compound capable of eliminating the sulphur from thiourea, such as zinc oxide, lead oxide or lead carbonate, to obtain a disubstituted guanidine. In an example diphenyl-guanidine is obtained from *sym*-diphenylurea, zinc

oxide, and strong aqueous ammonia, heated to 80° C. The zinc sulphate and zinc oxide also produced are removed by boiling with hydrochloric acid, neutralising with sodium acetate precipitating the zinc by sulphuretted hydrogen, and then finally adding alkali to liberate diphenyl guanidine. The product is a vulcanisation accelerator.

199,360. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, June 13, 1922.

Sulphuretted dyes are obtained by heating the leuco-indophenol from carbazole and *p*-nitrosophenol with an alkali polysulphide in presence of benzidine.

199,401. PERYLENE. H. Pereira, 3, Freyung, Vienna. International Convention date, June 19, 1922.

The reduction of 1·12-dioxyperylene to perylene with zinc dust (see specification 165,770, THE CHEMICAL AGE, Vol. V., p. 287) is carried out in the presence of a hygroscopic substance such as calcium, zinc, aluminium or magnesium chloride. The product is crystallised from toluene.

LATEST NOTIFICATIONS.

201,879. Treatment of silicious ores. Chief Consolidated Mining Co. August 4, 1922.
201,885. Process for the vulcanisation of rubber. Pirelli and Co. August 5, 1922.
201,898. Process for halogenating latex and compositions and articles made therefrom. Naugatuck Chemical Co. August 3, 1922.
201,912. Process for the vulcanisation of rubber. Pirelli and Co. August 5, 1922.
201,914. Articles (vessels, pipes, machinery parts, etc.) requiring a high resistibility against corrosion by ammonium chloride solutions. Krupp Akt.-Ges., F. August 2, 1922.
201,915. Articles (vessels, pipes, machinery parts, etc.) requiring a high resistibility against the attack of sulphurous acid at a high temperature and high pressure. Krupp Akt.-Ges., F. August 2, 1922.
201,922. Process for the production of phosphorescent zinc sulphide. "Allchemin" Allgemeine Chemische Industrie Ges. and Dr. R. Johoda. August 2, 1922.
201,925. Apparatus for treating gases discharged from and air-fed to producer plants. Mahieu, R.A.A.G. August 2, 1922.
201,927. Apparatus for the production of anhydrous tin chloride. Buss Akt.-Ges. August 4, 1922.
201,938. Method of, and apparatus for, electrically producing ozone. Ozon-Technik Akt.-Ges. August 3, 1922.
201,940, 201,941. Manufacture of silicates of the basic dyestuffs. Eberlein, W. August 6, 1922.
201,942. Recovering chromic salts from residues containing chrome. Jucker and Co. Chemische Fabrik. August 7, 1922.
202,263. Process for manufacturing soaps poor in water. Legradi, Dr. T. August 8, 1922.
202,283. Burning of sulphur. Texas Gulf Sulphur Co., Inc. August 8, 1922.
202,299. Electrolytic recovery of zinc from zinc-bearing ores and metallurgical products. Electrolytic Zinc Co. of Australia, Ltd. August 9, 1922.
202,302. Arrangement for obtaining water-gas or low-grade gas. Fajole, E. August 8, 1922.
202,311. Process of conversion of gaseous aliphatic ethylene carbides into liquid carbides. Soc. Ricard, Allenet et Cie. August 9, 1922.
202,317. Processes for the constructive conversion of hydrocarbons. Berry, H. R. August 10, 1922.

Specifications Accepted, with Date of Application

183,120. Refractory metals, such as tungsten or the like, Manufacture of. General Electric Co., Ltd. July 13, 1921.
183,823. Mineral oils from bituminous rocks, Method of obtaining. L. Kern. July 27, 1921.
190,448. Ore roasting or like operations, Furnaces or the like for. A. V. Leggo. Dec. 19, 1921.
195,061. Hydrogen sulphide, Process for removing from gases. T. P. L. Petit. March 16, 1922.
197,302. Separation of the constituents of gaseous mixtures. L'Air Liquide Soc. Anon pour l'Etude et l'Exploitation des Procédés G. Claude. May 8, 1922.
201,610. Dyes of the anthraquinone series. British Dyestuffs Corporation, Ltd. J. Baddiley and W. W. Tatum. April 28, 1922.
201,624. Carbazole and *p*-nitrosophenol and its derivatives, Manufacture of condensation products from. W. L. Galbraith, W. Lewcock and S. B. Tallantyre. May 2, 1922.
201,625. *N*-substituted carbazoles and *p*-nitrosophenol and its derivatives, Manufacture of condensation products from. W. L. Galbraith, W. Lewcock and S. B. Tallantyre. May 2, 1922.
201,664. Producer gas plant. E. E. Bentall and G. C. Bingham. May 10, 1922.
201,712. Azo-dyestuffs, Manufacture of. A. G. Bloxam. (*Chemische Fabrik Griesheim Elektron.*) June 22, 1922.
201,746. Grinding and crushing mill. R. J. Hunt and R. Hunt and Co., Ltd. July 17, 1922.
201,786. Vat colouring matters, Process for producing. S. Sokal. (*Kalle and Co., Akt.-Ges.*) August 24, 1922.
201,817. Recovery of metal from metallic dross. H. D. Rees. October 16, 1922.

Applications for Patents

Adler, R. Process for increasing porosity of decolorising charcoal. 20,769. August 16. (Czecho-Slovakia, August 19, 1922).
Beilby, Sir J. T. Hydrogenation of hydrocarbon oils and residues. 20,125. August 8.
Berry, H. R. Constructive conversion of hydrocarbons. 20,400. August 10. (United States, August 10, 1922.)
Calvert, G. Treatment of rubber latex. 20,641. August 14.
Chemosan Akt.-Ges. Production of mercury derivatives of hydroxy-benzene, sulphonic acids, etc., for use in therapeutics. 20,425. August 10. (Austria, August 17, 1922.)
Christenson, O. L. Producing ammonium chloride from ammoniacal hot distillation or generator gases. 21,022. August 18. (Sweden, February 9).
Durand and Huguenin Akt.-Ges. Manufacture of products for dyeing or printing textile fibres. 20,401. August 10. (Germany, August 21, 1922.)
Durand and Huguenin Akt.-Ges. Manufacture of products for dyeing textiles, etc. 20,488. August 11. (Germany, August 21, 1922.)
Fröhlich, J. Manufacture of sulphurised dyestuffs. 20,925. August 17.
Gaillard, E. A. Manufacture of sulphuric acid. 20,385. August 10 (France, August 12, 1922.)
General Motors Research Corporation. Manufacture of compounded metallic elements. 20,671. August 14. (United States, May 19).
Imray, O. Y. (Naamlooze Vennootschap Silica en Ovenbouw Maatschappij). Manufacture of coke and manufacture of gas therefrom. 20,131. August 7.
Johnson, E. (Badische Anilin- und Soda-Fabrik). Production of vat colouring matters. 20,748. August 15.
Laing, B. Gasification and distillation of carbonaceous materials. 20,953. August 17.
Plausons' (Parent Co.), Ltd. (Plauson). Treatment of mineral oils. 20,352. August 10.
Potts, H. E. (Naamlooze Vennootschap Algemeene Norit Maatschappij). Manufacture of decolorising carbon. 20,256. August 9.
Redfern, C. G. (Pintsch Akt.-Ges.). Process for obtaining nitric oxide. 21,008. August 18.
Ricard, Allenet, et Cie. Conversion of gaseous aliphatic ethylene carbides into liquid carbides. 20,298. August 9. (Belgium, August 9, 1922.)
Sauer, J. N. A. Purifying and sterilising liquids and gases. 21,018. August 18. (Germany, August 18, 1922).
Shadbolt, S. M. Distillation of tar. 20,574. August 13. Society of Chemical Industry in Basle. Manufacture of sulphurised dye-stuffs. 20,925. August 17.
Testrup, N. Separation of liquid from solids. 20,872. August 16.
Tucker and Co., Chemische Fabrik. Recovering chromic salts from residues. 20,132. August 7. (Germany, August 7, 1922.)

Chemical Engineering Courses in U.S.A.

LECTURES on chemical engineering are to be given for the benefit of students at the Ninth National Exposition of Chemical Industries to be held from September 17 to 22 at New York. Accommodation for students is being provided by Columbia University. The plans for the course include lectures in the mornings on three general topics, viz., plant equipment in the chemical engineering industries; materials of construction and chemicals in commerce. In the afternoons there will be supervised visits of the exhibition, conferences, meetings of societies, and cinematograph films of chemical industries will be shown. The course will be under the direction of Professor W. T. Reade, of Yale University. The lectures are being arranged on the plan of having a speaker to give a general outline of a subject in the course of about an hour, followed by others dealing with more specialised aspects of the same subject, who will speak some fifteen minutes each.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to* THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers ; those interested in close variations in prices should study the market report.

London, August 23, 1923.

INQUIRY has been slightly better during the past week, although orders have only been for small quantities. Forward prices from the Continent are, on the whole, higher, which has a tendency to keep spot prices firm.

Export inquiry has also been better, although little actual business has been consummated.

General Chemicals

ACETONE continues in short supply and price is again higher.

ACID ACETIC is none too plentiful and price is firm.

ACID CITRIC.—Without change.

ACID FORMIC.—Higher with little offering for prompt delivery.

ACID LACTIC is in good request and the price for forward is firmer.

ACID OXALIC.—Forward quotations are higher.

ARSENIC.—Inquiry is slower, with buyers disinclined to operate far ahead. Makers, however, are well sold for near delivery.

BARIUM CHLORIDE has been in good request and shows a higher price.

BLEACHING POWDER.—Unchanged.

CREAM OF TARTAR.—A fair volume of business has been passing during the past week at last-mentioned prices.

FORMALDEHYDE continues in short supply, and there has been no change in price since the Referee's decision has been published.

LIME ACETATE is inquired for and in none too plentiful supply.

LEAD ACETATE is in slightly better supply, price unchanged.

LITHOPONE in fair request without change in price.

MAGNESIUM CHLORIDE in slightly less demand.

CAUSTIC POTASH.—The price, if anything, is slightly lower with little business passing.

POTASSIUM CARBONATE.—A small business is passing without change in price.

POTASSIUM PERMANGANATE in good demand.

POTASSIUM PRUSSIATE.—The makers' price has again been reduced this week and inquiry is being kept up.

SODIUM NITRITE.—Price higher and in short supply.

SODIUM PHOSPHATE.—Price steady and stocks are light.

SODIUM PRUSSIATE shows no change.

SODIUM SULPHIDE continues easy although the demand has slightly improved.

ZINC SALTS are moderately active.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID has been quiet. Makers' prices are well maintained.

ACID SALICYLIC.—Makers' output is well sold ahead. Slightly higher prices are asked for spot by some holders.

BROMIDES unchanged. Small demand.

MERCURIALS.—Weak in sympathy with the metal.

COCAINE.—Very firm.

EUCALYPTUS OIL.—In short supply, market advancing.

HEXAMINE.—Easy.

SALOL.—Firmer.

THEOBROMINE.—The large export demand has almost cleared the market.

VANILLIN.—Unchanged.

Coal Tar Intermediates

The present holiday season is interfering with business to some extent, but the Continent continues to display interest in various products.

ALPHA NAPHTHOL continues firm and export inquiries are in the market.

ANILINE OIL.—Some Continental orders are open, but there are some slight difficulties in clinching the business.

ANILINE SALT.—Foreign buyers are again becoming interested.

BENZIDINE BASE.—Both home and export orders have been received.

BETA NAPHTHOL.—Some small export inquiry is about.

DIMETHYLANILINE.—Some home trade is reported.

DIPHENYLAMINE is firm with some home business in the market.

" H " ACID has been a fair business at last quoted price.

NITRO BENZOL.—Some small inquiry has been received on home account.

PARAPHENYLENEDIAMINE is unchanged.

RESORCINE is without special feature.

Coal Tar Products

Prices generally for Coal Tar Products keep steady, and there is no change of sufficient importance to call for remark.

90% BENZOL is being freely offered at 1s. 5d. per gallon on rails.

PURE BENZOL is worth 1s. 9d. to 1s. 10d. per gallon on rails.

CREOSOTE OIL is firm, and is quoted at 8¼d. to 8½d. per gallon on rails in the South and 9¼d. to 9½d. per gallon in the North.

CRESYLIC ACID is plentiful, and is quoted at about 2s. per gallon on rails for the Pale quality 97/99%, while the Dark quality 95/97% is worth 1s. 8d. to 1s. 9d. per gallon.

SOLVENT NAPHTHA is in poor demand, and is worth about 1s. 3d. per gallon.

HEAVY NAPHTHA has also a poor market, and is worth about 1s. 5d. per gallon on rails.

NAPHTHALENES have a slightly improved inquiry, without, however, any advance being shown in the price. The lower qualities are worth £6 5s. to £7 per ton, while 74/76 and 76/78 qualities are worth from £8 to £8 10s. per ton.

PITCH.—Transactions are still extremely limited, prices remaining unchanged.

Sulphate of Ammonia

There is very little change to report, the demand remaining quiet.

French Potash

CONSEQUENT upon the favourable prices at present ruling for all grades of French potash salts, inquiries have been numerous during the past week, and the booking for autumn delivery has been unusually heavy for this season of the year. Fourteen per cent. and 20 per cent. are most in demand, and advantage is being taken of the low price per unit at which the latter grade of potash is offered. The good keeping qualities of French potash salts combined with apprehension of an upward tendency in quotations is causing manufacturers to procure their requirements without delay, and 30 per cent. and muriate are in consequence in increasing request. With the exception of high grade shipments to the Colonies, little is being done on an immediate delivery basis.—*French Potash Mines Information Bureau.*

American Coal Tar Exports

UNITED STATES exports of all coal-tar chemicals during May, 1923, increased 117 per cent. over May, 1922, and 98 per cent. over January, 1923, but only 16 per cent. over April, 1923. The aggregate value for May (the highest for the year thus far) amounted to $1,270,611. The progress made in the finished coal-tar products industry in 1923, especially in colours, dyes and stains, is further evidenced by an increased foreign demand, exports in May totalling 1,830,068 lb., valued at $539,358, while imports amounted to but 294,555 lb., worth $388,309.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99–100%	ton	71	0	0	to	72	0	0
Acetic, 80% pure	ton	50	0	0	to	51	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	88	0	0	to	90	0	0
Boric, commercial	ton	50	0	0	to	55	0	0
Carbolic, cryst. 39–40%	lb.	0	1	5	to	0	1	5½
Citric	lb.	0	1	8½	to	0	1	9
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	38	0	0	to	39	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	26	0	0	to	27	0	0
Oxalic	lb.	0	0	6¼	to	0	0	6½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	4	to	0	1	5
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	32	15	0			—	
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	65	0	0	to	68	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	225	0	0	to	260	0	0
Arsenic, white powdered	ton	73	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	10	0	to	16	0	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals	ton	27	0	0	to		—	
Calcium acetate, Brown	ton	12	10	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	100	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	92	0	0	to	93	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	97	10	0	to	98	0	0
Formusol (Rongalite)	lb.	0	2	1	to	0	2	2
Glauber salts, commercial	ton	4	10	0	to	5	0	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	43	0	0	to	45	0	0
Carbonate (White Lead)	ton	43	0	0	to	45	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	15	0	to	4	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	78	0	0	to	80	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	35	0	0
Potassium bichromate	lb.	0	0	5½	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	3	0	to	0	3	2
Prussiate, yellow	lb.	0	1	1	to	0	1	2
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3¼
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	1	0	to	0	1	1
Prussiate	lb.	0	0	6¼	to	0	0	6½
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	14	10	0	to	15	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	2	to	0	1	3
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

	Per	£	s.	d.		£	s.	d.
Acetyl salicylic acid	lb.	0	3	0	to	0	3	3
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	1	10½	to	0	2	3
Salicylic, B.P.	lb.	0	2	0	to	0	2	3
Tannic, leviss.	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	9	to	0	8	3
Amidopyrin	lb.	0	12	0	to	0	12	6
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	18	0	to	1	0	0
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7	to	0	0	7½
Potash	lb.	0	0	6	to	0	0	6½
Soda	lb.	0	0	7	to	0	0	7½
Caffeine, pure	lb.	0	10	9	to	0	11	0
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	10	to	0	2	0
Calomel	lb.	0	4	0	to	0	4	3
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	0	18	6	to	0	19	0
Hydrochloride	oz.	0	15	9	to	0	16	3
Corrosive sublimate	lb.	0	3	8	to	0	3	10
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	1	to	0	2	2
B.P. (75–80% eucalyptol)	lb.	0	2	3	to	0	2	4
Guaiacol carbonate	lb.	0	8	3	to	0	8	6
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	3	8	to	0	3	10
Hydroquinone	lb.	0	3	3	to	0	3	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	3	to	0	2	6
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	2	6	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	7½
Phenacetin	lb.	0	6	3	to	0	6	6
Phenazone	lb.	0	7	0	to	0	7	3
Phenolphthalein	lb.	0	6	9	to	0	7	0
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	8	to	0	2	9
Salol	lb.	0	3	0	to	0	3	3
Soda Benzoate	lb.	0	2	4	to	0	2	6
Sulphonal	lb.	0	14	6	to	0	15	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	10	6	to	0	11	0
Soda salicylate...	lb.	0	7	6	to	0	7	9
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	4	9	to	0	5	0
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	6	to	0	2	8
Naphthionate of Soda	lb.	0	2	6	to	0	2	8
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.

		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	11
Bay		0	12	0
Bergamot		0	12	0
Cajaput		0	3	6
Camphor, white	per cwt.	4	0	0
Brown	,,	3	15	0
Cassia	c.i.f. 10/- spot	0	11	6
Cedarwood		0	1	4½
Citronella (Ceylon)	very scarce on spot, c.i.f. 3/0	0	3	6
(Java)	c.i.f. 3/11	0	4	2
Clove		0	7	6
Eucalyptus	firm and dearer	0	2	1
Geranium Bourbon		1	10	0
Lavender	dearer	0	15	0
Lavender spike		0	3	0
Lemon		0	3	0
Lemongrass	c.i.f. position harder, per oz.	0	0	2½
Lime (distilled)		0	4	0
Orange sweet (Sicilian)	easier	0	13	0
(West Indian)	,,	0	9	6
Palmarosa	dearer	1	3	0
Peppermint (American)	harder	0	13	0
Mint (dementholised Japanese)		0	7	3
Patchouli		1	10	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	8
Sandalwood		1	6	0
Sassafras	dearer	0	6	6
Thyme	2/6 to	0	8	0

Synthetics.

	£	s.	d.
Benzyl acetate	0	3	0
Benzoate	0	3	0
Citral	0	10	0
Coumarine	0	18	6
Heliotropine	0	8	0
Ionone	1	5	0
Linalyl acetate	1	2	6
Methyl salicylate	0	2	6
Musk xylol	0	11	0
Terpeniol	0	3	0

Centrifugal Separators, Ltd.

THE third annual general meeting was held in London on Friday, August 10, Commander Sir Arthur Trevor Dawson presiding.

The Chairman, in moving the adoption of the report and accounts, said that a year ago he had stated that although the number of machines actually sold was not large they had quite a considerable amount of business in prospect. If he were to use these same words again he believed he would be summing up the position at this date quite correctly, and if he spoke with hope last year he certainly felt that he could do so now—probably not quite as regarded immediate results, but, viewing the prospect generally, he was advised that there were distinct indications of an improvement, given a maintained improvement in other trades. One satisfactory feature was that in industries regularly using the separators the machines were giving satisfaction. A testimonial had come to hand only this week from a very well-known firm who had had two of the machines working for two years. With regard to the subsidiary company referred to in the report, it had been formed to place upon the market an improved type of separator, and all the indications pointed to their being able to do a remunerative business in that direction. It would not compete with, but might even help the sale of, the Gee Separator. The China Clay Co., in which they were large shareholders, had since last year been manufacturing and selling China Clay of a high quality. The clay which had been manufactured had been made by the Gee machines, and it was of a quality equal, if not superior, to the best China Clay upon the market.

The report and accounts were unanimously adopted.

British Phosphate Commission

THE second year's trading in Naura and Ocean Island phosphate shows an improvement. The cargoes shipped totalled 361,205 tons, compared with 364,251 tons for the first year. The consignments to Australia amounted to 47·20 per cent., to New Zealand 10·64 per cent., to the United Kingdom 4·45 per cent., and to other countries 37·71 per cent. The shipments to England, Australia, and New Zealand were made at satisfactory prices. The gratifying results obtained during the first two years' working have enabled the Board of Commissioners to effect considerable reductions in selling prices for the third year. A credit balance of £90,638 is the financial result of the second year's operations.

Australian Sulphur Duty

THE Australian Government, in view of the "Country Party's" agitation for cheaper superphosphates, has introduced a Bill to remove the sulphur duty, approximating 85 per cent., and to substitute a bounty of 45s. a ton on sulphuric acid obtained from pyrites manufactured in the country. This bounty, amounting to £100,000 a year, will adequately protect Mount Lyell works and the projected electrolytic zinc works. There is a specific provision that if the bounty should be removed the duty will automatically be restored.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* The Chemical Age *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, August 22, 1923.

The heavy chemical market remains quiet, and the few inquiries there are call for only very moderate quantities.

Shipments continue to be received from the Continent, but, owing to the very unsettled conditions prevailing, importers are buying in very limited quantities.

Industrial Chemicals

Acid, Acetic.—Glacial, 98/100%, £60 to £63 per ton, in casks; 80% technical, £47 to £48 per ton; 80% pure, £50 to £52 per ton, c.i.f. U.K. ports, duty free.

Acid, Boracic.—Unchanged. Crystals or granulated, £50 per ton; powdered, £52 per ton, carriage paid U.K. stations, minimum ton lots.

Acid, Carbolic (Ice Crystals).—Price well maintained at about 1s. 2d. per lb. delivered.

Acid, Citric.—In little demand, B.P. crystals about 1s. 6d. to 1s. 6½d. per lb.

Acid, Formic, 80%.—Unchanged at £50 per ton.

Acid, Hydrochloric.—In little demand. Price 6s. 6d. per carboy, ex works.

Acid, Nitric, 80°.—About £23 10s. per ton, ex station, full truck loads.

Acid, Oxalic.—Unchanged at about 6d. per lb.

Acid, Sulphuric.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, £1 per ton more.

Acid, Tartaric.—Quoted 1s. 2¼d. per lb., less 5% ex store.

Alum, Lump Potash.—Now offered at £11 per ton, ex store.

Alum, Chrome.—Price about £23 per ton, f.o.b. U.K. port.

Alumina, Sulphate.—17/18%, £10 15s. per ton; 14/15%, £7 17s. 6d. per ton, c.i.f. U.K. port.

Ammonia, Anhydrous.—Unchanged at about 1s. 5d. per lb. ex station.

Ammonia, Carbonate.—Lump, 4d. per lb. Ground, 4¼d. per lb. delivered.

Ammonia, Liquid, 880°.—Unchanged at about 3½d per lb., ex station. Containers extra.

Ammonia, Muriate.—Grey galvanizers' quality now quoted £32 to £33 per ton. Fine white crystals, £22 15s. per ton, ex wharf, early delivery.

Ammonia, Sulphate.—25¾%. Neutral quality, £14 per ton, ex works. Aug./September.

Arsenic, White Powdered.—Makers' prices show a slight decrease. Quoted £68 per ton, f.o.b. U.K. port. Spot lots about £74 per ton, ex wharf.

Barium Chloride. 98/100%.—Spot lots offered at £15 per ton, ex store.

Barytes.—Finest white English, £5 5s. per ton, ex works.

Bleaching Powder.—£11 7s. 6d. per ton, ex station, spot delivery. Contracts 20s. per ton less.

Borax.—Granulated, £26 10s. per ton. Crystal, £27 per ton. Powdered, £28 per ton, carriage paid U.K. stations, minimum ton lots.

Calcium Chloride.—English make unchanged at £5 12s. 6d. per ton, ex quay or station. Continental material about £4 5s. per ton, c.i.f. U.K.

Copperas, Green.—About £2 2s. 6d. per ton, f.o.b. U.K. port.

Formaldehyde, 40%.—Spot material practically unobtainable. Quoted £93 per ton, c.i.f. U.K. port, duty paid.

Glauber Salts.—Fine white crystals quoted £3 15s. per ton, ex store.

Lead, Red.—English makers' price £40 per ton, carriage paid U.K. stations. Continental material about £34 15s. per ton, ex store.

Lead, White.—Offered from Continent at £36 per ton, c.i.f. U.K. ports.

Lead Acetate.—White crystals quoted £38 15s. per ton, ex wharf, early delivery.

Magnesite, Ground Calcined.—English burnt material, £8 5s. per ton, ex station. Finest Continental about £7 5s. per ton, c.i.f. U.K. ports.

Magnesium Chloride.—Continental material unchanged at 32s. 6d. per ton, c.i.f. U.K. ports. Spot lots, £2 12s. 6d. per ton, ex store.

Magnesium Sulphate (Epsom Salts).—Commercial quality, £7 per ton; B.P. quality, £8 5s. per ton, ex station. Continental commercial crystals quoted £4 per ton, ex store.

Potash, Caustic, 88/92%.—Spot lots, about £32 per ton, ex store.

Potassium, Bichromate.—Unchanged at 5⅜d. per lb. delivered.

Potassium, Carbonate.—96/98% now offered at £28 15s. per ton, c.i.f. U.K. port; 90/92% about £26 10s. per ton, c.i.f. U.K. port.

Potassium, Chlorate.—Unchanged at about 3d. per lb., ex store.

Pottassium, Nitrate (Saltpetre).—Offered at £23 per ton, c.i.f. U.K. port.

Potassium Permanganate.—B.P. crystals on offer at 10½d. per lb., ex store.

Potassium Prussiate (Yellow).—In little demand, now offered at about 1s. 2¼d. per lb., ex store.

Soda, Caustic.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99 per cent., powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

Sodium Acetate.—Spot lots about £25 5s. per ton, ex store. Offered at £24 per ton, c.i.f. U.K. port, early shipment.

Sodium Bicarbonate.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

Sodium Bichromate.—Unchanged at 4½d. per lb., delivered.

Sodium Carbonate.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 16s. per ton, ex quay or station.

Sodium Hyposulphite.—Continental commercial crystals offered at £7 15s. per ton, c.i.f. U.K. Spot lots about £9 10s. per ton, ex store. Pea crystals, £14 10s. per ton, ex store.

Sodium Nitrate.—Refined 96/98%, about £13 7s. 6d. per ton, f.o.r. or f.o.b. U.K. port.

Sodium Nitrite.—100%, £26 to £28 per ton, according to quantity.

Sodium Prussiate (Yellow).—Now quoted at about 6¾d. per lb., ex store.

Sodium Sulphate (Saltcake).—Unchanged at about £4 per ton, ex station for home consumption. Higher prices for export.

Sodium Sulphide.—60/62% solid. Continental material unchanged at about £12 10s. per ton, c.i.f. U.K. Broken quality £1 per ton more.

Sulphur.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

Tin, Crystals.—Unchanged at 1s. 4d. per lb.

Zinc Chloride.—English material about £25 per ton; Continental material about £23 per ton, c.i.f. U.K. ports.

Zinc Sulphate.—Spot lots of Continental material on offer at £11 5s. per ton, ex store.

Note.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

Anthranilic Acid.—Inquiry for export. 8s. per lb., 100% basis, f.o.b.

Benzaldehyde.—Fair inquiry for export. Offered at 2s. 11d. per lb. f.o.b., drums included.

"H" Acid.—Some inquiry. Offered at 5s. per lb., 100% basis, f.o.b.

Meta Nitraniline.—Export inquiry. Price 3s. per lb., 100% basis, f.o.b.

Naphthionate of Soda.—Fair inquiry. Price quoted 2s. 8½d. per lb., 100% basis, carriage paid.

Para Toluidine.—Fair export inquiry. Price quoted 4s. 6d. per lb., f.o.b.

Para Nitro Phenol.—Fair export inquiry. Price 2s. 2d. per lb., 100% basis, f.o.b. U.K. port.

PARANITRANILINE.—Export inquiry. Quoted 2s. 7d. per lb., f.o.b.

PARA NITRO TOLUOL.—Some inquiry for export. Offered at 2s. 7½d. per lb., f.o.b.

PICRAMIC ACID.—Export inquiry. Price 3s. per lb., 100% basis, f.o.b.

"SS" ACID.—Export inquiry. Price 16s. 3d. per lb., 100% basis, f.o.b.

TOLIDINE BASE.—Good inquiry. Price quoted 7s. per lb., 100% basis, f.o.b.

Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, August 23, 1923.

CHEMICAL traders here can report no improvement either in the home or foreign demand for chemicals, and the state of the market is reflected this week in a further weakening of prices, a fair number of products being quoted on a lower basis than last week. Home consumers are doing little more than nibbling, purchases being comparatively small and mainly for early delivery. Continental business is still negligible, the bulk of the restricted demand for shipment coming from Canada, Australia, and the East.

Heavy Chemicals

Soda crystals are steady at £5 5s. per ton delivered, but the demand is only of small dimensions. Bicarbonate of soda is quiet on home consumption account at £10 10s. per ton delivered, with rather more stirring for shipment. Caustic soda still meets with a fairly active inquiry both for home use and for export; price reductions which have now come into operation represent a considerable drop on recent current rates, 70 per cent. material now being quoted at £16 17s. 6d. per ton and 76-77 per cent. at £18 7s. 6d., these prices being for contract lots, a premium of £1 per ton being charged for non-contract orders. Prussiate of soda is still inactive and again easier at about 6¼d. per lb. Saltcake keeps quiet on home account though prices are steady at £4 10s. per ton; a fair demand is being experienced for export. Little business is being done in Glauber salts though prices are unchanged at £4 per ton. Bleaching powder is in moderate demand at £11 7s. 6d. per ton to home users. Hyposulphite of soda is unchanged in position or value at £14 for photographic crystals and £10 for commercial. Sodium sulphide is quiet but prices are the same as last week at £14 10s. to £15 for 60-65 per cent. concentrated solid and £8 per ton for crystals. Alkali is steady and in fair demand both for home and export at £7 12s. 6d. per ton for 58 per cent. material. Nitrite of soda is quiet but steady at £26 10s. per ton, supplies, however, still being on the short side. Chlorate of soda is in moderately good demand at 2½d. to 2¾d. per lb. Phosphate of soda is steady but inactive at £14 10s. to £15 per ton. Bichromate of soda is in fair inquiry at 4½d. per lb. Acetate of soda is only in moderate request and prices are rather easier at £24 to £24 10s. per ton, though offers are still not excessive.

Caustic potash keeps fairly steady at £28 10s. to £29 per ton for 88-90 per cent. material, but the demand has fallen off. Carbonate of potash is selling only in moderate quantities and prices are easier at £29 to £30 for 96-98 per cent. and £27 per ton for 90-92 per cent. Yellow prussiate of potash keeps quiet at about 1s. 2d. per lb. Permanganate of potash is dull and a shade weaker at 9½d. per lb. Chlorate of potash is in fair inquiry but also fractionally easier at 2¾d. to 3d. per lb. Bichromate of potash is unchanged at 5¾d. per lb., and meets with a moderate demand.

Sulphate of copper is still quiet at £26 per ton f.o.b. Arsenic also is less active and easier at round £71 per ton in Manchester, for white powdered, Cornish makes. Both nitrate and sugar of lead are inactive sections, the former at £42 and the latter at about £41 for both brown and white. Commercial Epsom salts steady at £4 to £4 5s. per ton, with magnesium sulphate, B.P., at £6. Acetate of lime is rather cheaper, though still in short supply at £20 for grey and £11 per ton for brown.

Acids and Tar Products

Tartaric and citric acids are still quiet, and though prices have an easy tendency there is little quotable change in either case from last week's levels, tartaric being offered at 1s. 2d. to 1s. 2½d. and citric, B.P. crystals, at 1s. 7d. to 1s. 7½d. per lb. Acetic acid is hardly so firm as it has been for some time, and 80 per cent. technical is now quoted at £46 to £47, with glacial about unchanged at round £65. Oxalic acid is quiet but steady at 5½d. to 6d. per lb.

The pitch market is quiet, inquiry for next season's shipment having for the moment subsided; in the absence of offerings of any importance values are nominally firm at about £7 per ton Manchester. Creosote oil is firm on an improvement in the demand and the price is now up to 9d. per gallon. Solvent naphtha is quiet and easy at 1s. 4d. to 1s. 4½d. per gallon. The carbolic acid position is much the same as at last report, supplies both of crude and crystallised being short and prices firmly maintained at 3s. 4d. per gallon for crude and 1s. 2½d. to 1s. 3d. per lb. for crystal. Naphthalenes are only in moderate demand at the moment and prices are steady; refined is still offered at round £20 and crude £7 to £13 per ton according to quality. Cresylic acid is quiet at about 2s. per gallon.

Company News

SOUTH AFRICAN ALKALI CO.—The report for the quarter ended June 30 states that the production of soda was started on June 12 and that the output was 64·9 tons of soda ash of excellent quality and purity. The salt section was completed, and soon would be in operation.

LAND FERTILIZERS, LTD.—At a general meeting of the shareholders held at Tadcaster, West Yorkshire, it was resolved that the company should voluntarily be wound up, and that Mr. William Carr, of Barnsley, should act as liquidator.

UNITED INDIGO CO.—The directors recommend dividends of 5 per cent. for the half-year to June 30 on ordinary shares; and a further dividend of 10 per cent. on ordinary shares, making 15 per cent.; also a further dividend of 10 per cent. on the preference shares, making 15 per cent.

WILLIAM FULTON AND SONS, dyers, etc., Glenfield Works, Paisley.—The directors recommend a final dividend of 22½ per cent. (including bonus), making 25 per cent. for the year. £10,000 was written off for depreciation, £7,000 placed to reserve, and £8,000 to special reserve, and there remained a balance of £15,216 to carry forward.

MINERALS SEPARATION.—The report for 1922 shows excess of expenditure over income of £18,812, due to the company's plant for coal-cleaning and briquetting processes and for the new ore production process not having been in full operation and to dullness in the metal industries. The balance sheet shows investments in Conversion Loan, £301,571; National War Bonds, £69,566; investments, £115,015; cash at bank and in hand, £3,517.

NIGER CO.—Lord Leverhulme, addressing the shareholders at the annual meeting on Tuesday, said that trade in West Africa was so far no better than it was last year, and preference shareholders must not suppose that the transfer of funds from Lever Brothers (mentioned in the report) would make possible the payment of preference dividends at an earlier date. Lever Brothers were financing the Niger Co., and interest on the loan would rank prior to the claims of the preference shareholders. Replying to a question, Lord Leverhulme said he did not think the publication of a profit and loss account would help to make the resumption of dividend payments possible, therefore he declined to give any information as to the gross or net losses of the company during the last financial year. A motion put by a shareholder that the report and accounts should not be adopted was defeated by the votes of the Board, and the motion for the adoption of the accounts was carried.

B. LAPORTE, LTD.—The balance sheet for the year ended June 30 shows a profit of £20,713. To this is added £3,975 brought forward, making a total of £24,689. After the payment of £5,610 as dividends on the preference shares to June 30 there remains £19,079 for distribution, and the directors propose to allocate that sum as follows: To write off goodwill account, £441; transfer bad debts to reserve, £2,000; dividend on ordinary shares at the rate of 11 per cent., £6,600; and to carry forward, £10,038. During the year £17,932 has been expended on new plant and buildings.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Reduction of Capital

ALLOY WELDING PROCESSES, Limited and Reduced. Order of the High Court of Justice (Chancery Division) dated July 31, 1923, confirming the reduction of the capital of the above-named company from £130,000 to £45,000. Registered August 16. The reason for the reduction of the capital of the company is, that the amount by which the share capital of the company is reduced is unrepresented by available assets.

Company Winding Up

SLIMES TREATMENT (TRANSVAAL) SYNDICATE, LTD., 28, Victoria Street, Westminster. (C.W.U., 25/8/23.) First and final return to contributories: 8s. $1\frac{31}{40}$d. per share to holders of shares fully paid and $7\frac{31}{40}$d. per share to holders of shares 12s. 6d. paid up; payable any day except Saturday between 11 a.m. and 2 p.m., at the Office of the Official Receiver and liquidator, 33, Carey Street, Lincoln's Inn, London, W.C.2.

Companies Winding Up Voluntarily

METALLURGICAL CO., LTD. (C.W.U.V., 25/8/23.) Meeting of creditors at the Institute of Chartered Accountants, Moorgate Place, London, E.C.2, on Friday, August 24, at 12 noon. Particulars of claims by September 15 to the liquidator, G. H. Warmington, Portland House, 73, Basinghall Street, London, E.C.2.

VEETA CHEMICAL CO., LTD. (C.W.U.V., 25/8/23.) G. R. Lawson, 20, Exchange Buildings, Bradford, appointed liquidator. Meeting of creditors at 20, Exchange Buildings, Bank Street, Bradford, on Monday, August 27, at 3 p.m.

WATER SOFTENERS, LTD. Agreement entered into for the sale of the goodwill and assets to United Water Softeners, Ltd., W. G. Luton, 93, Queen Victoria Street, London, E.C.4, appointed liquidator. Meeting of creditors at 93, Queen Victoria Street, London, E.C.4, on Tuesday, August 21, at 11.30 a.m.

Bankruptcy Information

CURTIS, William Henry, residing at the Atlas Chemical Works Cottage, New Mills, in the county of Derby, and carrying on business at the Atlas Chemical Works, New Mills, in the said county of Derby, under the style or firm of W. H. CURTIS AND CO., manufacturing chemist. First meeting, August 30, 3 p.m., Official Receiver's Offices, Byrom Street, Manchester. Public examination, September 25, 10.30 a.m., Court House, Vernon Street, Stockport.

New Companies Registered

BANFF AND MORAY AGRICULTURAL CO., LTD., Grand Hotel Buildings, Elgin. Chemical and acid manufacturers, dealers and manufacturers in all kinds of fertilisers, etc. Capital, £20,000 in £1 shares.

BESWICK'S LIME WORKS, LTD., Brierlow, Hindlow, near Buxton. Capital, £25,000 in £1 shares. Quarry owners, lime burners, limestone, road metal, curb, and flag manufacturers.

BRITISH RAILWAYS HIGHWAY CORPORATION, Amberley House, Norfolk Street, Strand. Registered August 14 to carry into effect schemes for street traffic control, etc., and to carry on business as public works contractors, etc., tar merchants, manufacturers of chemicals, etc. Capital, £100 in £1 shares.

J. HALDENBY AND CO., LTD., 53, Ankle Hill, Melton Mowbray. Manufacturers of and dealers in plant, machinery, etc., for chemical and other works. Capital £1,000 in £1 shares.

LACTOBACILLINE, LTD., 15, Great St. Andrews Street, W.C.2. Importers of lactobacilline and other preparations of Leon Darasse, 13, Rue Pavée, Paris. Makers of and dealers in chemical and scientific instruments, etc., refiners of ores, assayers, distillers, etc. Capital, £100 in £1 shares.

PERMANENT BRONZING AND RESTORING SYNDICATE, LTD., 146, St. John's Street, E.C.1. Manufacturers and treaters of and dealers in bronze, brass and similar metals, chemists, druggists, etc. Capital, £2,500 in £1 shares.

SOPEX CO., LTD. Registered August 14. Manufacturers of soap, manufacturers and refiners of and dealers in all kinds of oils and oleaginous and saponaceous substances, pharmaceutical, manufacturing and general chemists and druggists, etc. Capital, £1,000 in £1 shares. Solicitors: Harold Elwell and Co., 65, Coleman Street, E.C.

TOMLINSON'S (MANCHESTER), LTD., 21 and 23, Embden Street, Chorlton-upon-Medlock, Manchester. Manufacturers of drugs, chemicals, etc. Capital, £2,000 in £1 shares.

WILLIAM PINCHIN AND CO., LTD., 2, Hague Street, E.C.2. Colour, paint and varnish manufacturers and white lead merchants. Capital, £6,000 in £1 shares.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Material.	Ref. No.
British West Indies	Paints, varnishes, etc.	216
Belgium	Shellac, Manilla gum, fish glue, and chemical products	220

Tariff Changes

GREECE.—Revisions recently introduced in the customs tariff affect a number of chemicals, including quinine; naphthalene; sodium sulphate, sulphide, and hypochlorite; chloride of lime and chloride of manganese.

ITALY.—Customs tariff modifications recently introduced have been published as a special supplement to *The Board of Trade Journal*, August 16.

Recent Wills

Mr. Thomas Barnes, chemist, of 29, Highgate Terrace, Fulwood (net personalty £5,749)....	£7,988
Mr. John Henry Baxendall (71), soap manufacturer, of Bradford (net personalty £6,028)....	£6,729
Dr. Charles Killick (48), of Spring Bank Place, Bradford, formerly of Maidstone, Kent (net personalty £2,305)	£4,157
Mr. John Wakefield, proprietor of Bellamy and Wakefield, chemists, of Edgbaston, Birmingham (net personalty £5,977)	£9,843
Mr. James Walton, of Failsworth, Lancs, senior partner in the Claytonbridge Dyeing and Finishing Co. (net personalty £247,439)......	£248,654
Mr. David Barias, of Dean Road, Partick, formerly Secretary to the Tharsis Sulphur and Copper Co., Ltd., of Glasgow, who died April 26, aged 91	£15,693
Mr. William Chew, gas engineer, manager of the Blackpool Corporation Gas Works, for fifty years in the service of the Corporation, who died April 9, aged 67 (net personalty £27,418)....	£45,916